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Review

E-Health Implementation Challenges: A Comprehensive Review of Digital Healthcare in the United States

Anay Mehta[1], Lais da Silva Dias[2], Mariana Espinal José[3], Ritvik Jillellamudi[4], Ruby Mathew[5], Ayush Chauhan[6], Karan Dhingra[7], Saloni Verma[8]

[1]Independent Researcher, New Jersey, United States of America
[2]Independent Researcher, São Paulo, Brazil
[3]Independent Researcher, Punta Cana, Dominican Republic
[4]Independent Researcher, Michigan, United States of America
[5]Independent Researcher, California, United States of America
[6]Department of Computer Science, Stanford University, California, United States of America
[7]Department of Biomedical Engineering, University of Ottawa, Ontario, Canada
[8]Department of Biomedical Engineering, Cornell University, New York, United States of America

Abstract

Interactions in the past involving healthcare have been carried out through conventional in-person methods. Due to modern issues and the growth of technology, the health sector has expanded to involve digital practices of healthcare, or e-health. E-health can be classified into several distinct subsidiaries (such as telehealth or electronic health records) serving as a potential solution to providing quality services around the world. Despite this, e-health comes with many challenges which can act as barriers of implementation and investment, which stifle its mass adoption which is so desperately needed, especially following the digital health growth resulting from the COVID-19 pandemic. Here we cover major challenges which come as a part of e-health investment and implementation worldwide, and how they have staggered or boosted the pursuit of more effective and efficient digital health practices. Centering our research focus on a specific region, in this case, the United States, makes real world setting statistics and investigations deeply addressed. In order to make the understanding of digital health artifacts in the United States easier, this article is a result of data collected from different sources that also mention other countries as well. We analyzed the global importance and effectiveness of e-health to later approach the challenges faced by the United States and give plausible initiatives to deal with such issues. Identifying this gap in the research of such a large and developing industry such as e-health is crucial to securing its future success in execution and adoption.

*Corresponding author: Mariana Espinal José

Email addresses:

anayvmehta@gmail.com (Anay Mehta), laissantos0203@gmail.com (Lais da Silva Dias), marianaespinaljose@gmail.com (Mariana Espinal José), ritvikj2020@gmail.com (Ritvik Jillellamudi), joonieowl@gmail.com (Ruby Mathew), ayushchauhan020305@gmail.com (Ayush Chauhan), k2dhingr@gmail.com (Karan Dhingra), sv458@cornell.edu (Saloni Verma)

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E-health, Digital Health, Economic Challenges

1. Introduction

For all countries and individuals alike, healthcare is a necessity for improving wellbeing. The World Health Organization (WHO) defined the health sector as a 'network of relationships between key institutional components of the health system of a country' [1]. With new obstacles which have arisen - such as the COVID-19 pandemic - there is a need to adapt by innovating. A recent example of innovation being the use of digital technology within the field of health. E-health, through the Global Initiative on Digital Health (GIDH), plans to provide equitable, efficient, and high-quality health services for all countries [2]. In a Digital Health Impact Framework (DHIF), factors such as malaria telehealth are estimated to save 13,651 lives within 6 years but bring up an economic obstacle as it is estimated to bring a -88% cumulative socioeconomic return (SER) [3]. In particular, digital health growth has been stimulated by the COVID-19 pandemic and the need for more digitized and efficient medical services. Taking this issue into account, many studies have focused on a variety of challenges in e-health implementation, but few researchers have gone in depth with addressing the economic values and barriers behind the future of digital health, taking into account the stakeholders involved as major financial contributors.

E-health has progressed at many different paces throughout the years. Its large growth in development and research culminated during the COVID-19 pandemic, where digital health services became crucial and highly sought after [4]. This massive expansion in addition to other circumstances have led to many challenges, including those related to economic issues like stalling investment progression or to social matters like successful implementation [5], both linked to the rise of demand [6]. Lack of well established frameworks by governments and little information available to investors regarding implementation strategies and efficiency have led to stalls, particularly in investment into the field [3]. This is not to say that more established frameworks for implementation do not exist now in the modern day. Over the past 5-10 years, governments including many European countries and the United States have established plans such as "the European e-health action plan" [7] and 'the HITECH act' [8], respectively.

The Global Strategy on Digital Health proposed by the World Health Organization (WHO) emerged through a consultative process initiated in March 2019, which incorporated online public forums discussions, technical discussions, meetings of regional committees of WHO and even the Executive Board at its 146th forum.The global strategy on digital health 2020-2025 was endorsed by the Seventy-third World Health Assembly in 2020, being based on building resolutions adopted by the United Nations for health insurance, specifically about insurance of remote health. This global strategy has the purpose of strengthening health systems by including digital health technological practices for patients, health professionals, providers and industries in general that aim to assent consumers and spread health for all. It was planned also to fulfill all Member States access limits on technology, goods and services [9].

Before the pandemic's declaration as a Public Health Emergency (PHE), e-health devices faced barriers in usage in the United States. Particularly regarding telehealth, it had regulatory and reimbursement issues: providers only received payment for rural or shortage-affected patients, and such patients could not even connect purveyors from home. Another point was that coverage and payment parity varied based on insurance and private payer. The situation started to change in March of 2020, when the Centers for Medicare and Medicaid services adjusted the original site requirement, allowing patients to engage in telehealth from their homes. This was soon followed by state-wide declarations of calamity as well as allowance of private payers and government insurance to work for new ways to assess patients, provide care even beyond state lines, eliminate co-pays of telehealth and ensure payment parity due to the complex situation faced [10]. Along with economic traits, exploring social artifacts improvement is very constructive since it is associated with equitable promotion. So taking into account the variety of involved stakeholders, what are the major economic and financial challenges that need to be addressed for future e-health progression? This is the question our research aims to explore, as discussing the obstacles is the first step in knowing what needs to be tackled for sufficient progression. Such analysis is very relevant to the health field because digital health is playing a significant role in peoples' lives, principally in the last 5 years.

2. Methodology

2.1. From Manual to Modern

Throughout the years, technology has reached new heights to improve healthcare. For example, there have been advances in artificial intelligence which have improved diagnosis and drug development, apps created for mental health support, digital health solutions to support the elderly and people with chronic diseases, and more [11]. This has served as a beneficial financial solution for several challenges as it has created a more efficient strategy towards health-related development. Especially after the COVID-19 pandemic, digital technology has become prominent within daily culture and the workplace, and has saved many lives.

The transition from traditional healthcare to e-health brings new challenges to uncover, a larger pool of stakeholders, and modernized subsidiaries (such as EHRs or telemedicine) to maintain. Some experts in the field of health may argue that the conventional methods of healthcare allow for more precise and efficient patient diagnosis, while others may reason that digital technology brings more opportunity regarding stakeholder profit, boosting customer-centricity in the process. While traditional healthcare requires in-person meeting, e-health saves time due to its remote nature, allowing for more patients to be treated while also benefiting providers and health institutions with more opportunities for profit. Furthermore, in pandemic-like situations, digital health technology has proven to be the cutting edge solution allowing for quick treatment of individuals through minimal face-to-face contact, as modeled by South Korea who utilized this innovation to flatten their first wave of COVID-19 within two months [12]. Despite this, modern digitalization in the health sector introduces modern challenges which are more prominent in e-health as opposed to traditional healthcare. For example, issues such as the data breaching of EHRs, and the digital exclusion of underprivileged individuals threaten the quality of digital healthcare services [13, 25]. These are just a few of the certain matters we further discuss within our research.

2.2. Stakeholders Involved In Growth

As e-health is a complex new endeavor with many subsections and complex logistics, there are many stakeholders involved within it. A stakeholder can be any affiliated entity involved within e-health. In this case, everyone would be involved at some point whether they are a consumer who receives services, a provider who gives services, or a regulator which takes charge in making sure the service is up to par. Stakeholder involvement is seen as an enabling resource for successful policy implementation and can even be effective in poorer countries [6]. Hence, stakeholder engagement is a crucial facilitator towards the future of e-health [14]. Despite this, conflict within specific stakeholder groups may bring up negative aspects to their roles as well. There are many different stakeholders, however our research took a closer look at some of the key groups involved.

Hospitals and physicians - examples of service providers in both public and private sectors - are considered as a bridge between developers, government, and patients.

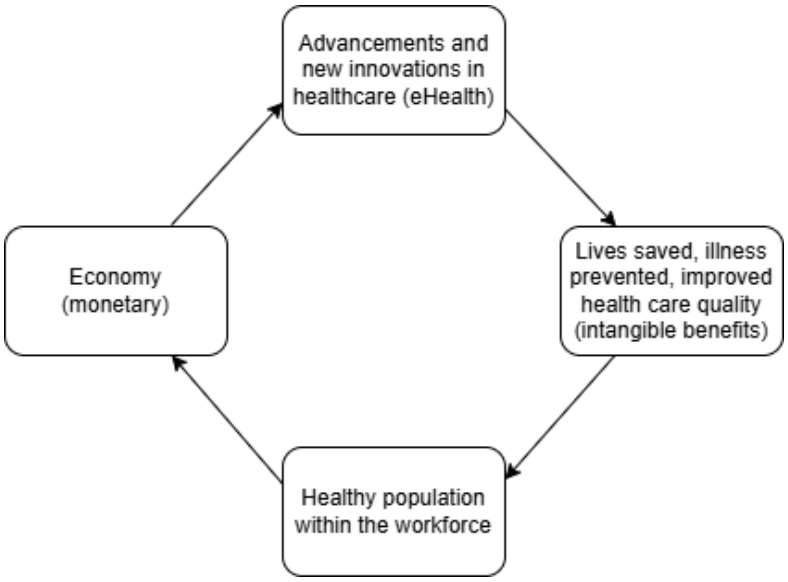

Figure 1. *A Model of E-health Impact from an Economic and Social Standpoint.*

They are responsible for the care their patients receive and strive to provide low-cost services. Moving forward with digitalization, this desire can prove to be an efficient amenity within e-health. However, with the corporate environment being motivated by economic gains, providers must ensure they continue to prioritize their patients' healthcare needs [13]. This is because the quality of services provided is crucial to maintain the population's health and from an economic perspective, also serves as a hook for more patients as stakeholders.

Anyone in the general public can be a patient, including citizens and communities. Investments made for them may include monetary values which are then translated into intangible benefits for the patients such as the saving of lives, illness prevention, time savings, and improved health care quality [3]. While this may be a positive for patients, it is important that the investment return rate is considered while implementing e-health to make sure the overall economy is also benefiting the patient and getting more efficient services for their investment. Figure 1 brings a perspective of e-health's social and economic impact.

At the core of stakeholder engagement is the government [15]. Low government capacity, or involvement, constrains the ability to set laws and creates complexity which may make regulatory decisions less likely [6]. Legislation regarding e-health would have to ensure that all rules and regulations are in compliance with government protocols which also makes sure risky economic decisions are not being made. Therefore, as the government is a major stakeholder of e-health, they are responsible for investing in efficient e-health implementation plans and frameworks.

Donors and Private investors are those who help finance new e-health endeavors and processes, allowing for increased growth within the developing sector. Because of this, donors and private investors have a right to transparency knowing where and how their funds are spent. However, with constant government interference and regulations, they may feel hindered in providing project investment [6]. This means that donors are discouraged from investing within areas of high government capacity. Hence, e-health implementation would be negatively impacted because these investors play a key role in the funding for e-health.

While each individual stakeholder group hopes to gain benefits from e-health implementation, the project is ultimately meant to be customer-centric. For the government, this centricity brings benefits because a healthy population creates a stronger workforce, allowing for more revenue as articulated in Figure 1. And because e-health is to provide faster and more remote services as opposed to conventional healthcare, the innovation brings even more profit. This is due to the fact that quicker services allow for efficient time-saving opportunities, meaning providers can increase the amount of patients they are seeing. This thereby increases profit for the healthcare institution and provider, while also allowing for extra time to provide patients with personalized care. The remote tools offered by e-health creates particular access experiences for customers, which ends up promoting faster and multifaceted means for devices and services, in addition to the unique perceives of healthcare. For customers, the GIDH plans to achieve Universal Health Coverage (UHC) [2]. If this is successfully implemented in the USA, digital technology can lift a great deal of financial burden off of patients because the USA is a country which does not provide universal healthcare. This customer satisfaction serves as a beneficiary factor for investors who would gain more notability from their esteemed investment. Patient appraisal is also advantageous for healthcare providers because it means more prospective customers. Additionally, service providers gain more work satisfaction through their patient contentment. This loyal clientele allows for economic improvement to their association which in turn brings a higher income for each worker in e-health. Not only does this benefit healthcare workers and providers, but it also greatly helps the patient receiving the care, who is being provided with a user-friendly, efficient, and effective approach to traditional e-health services. This practice is also advantageous because as more health services are digitized and e-health practices spread, the price for healthcare as a whole decreases, greatly benefiting the consumer.

The presence of neoliberalism brings up a conflict between the government and any major investors. While policy allows for structure and more regulatory decisions along with the funding of efficient, equitable projects, discouragement among investors would hinder mass financing and promotion of the e-health plan. However, looking at the USA, this might be less of a conflict due to the country's mixed economy which means the government can intervene but does not control all economy. This is beneficial because a mixed economy provides more flexibility for both parties. Keep in mind, this challenge between policy and investors may only be prominent to certain groups, and many investors might find their transparency within investing intact. As previously mentioned, transparent and timely communication between stakeholder groups is a necessary factor in successful e-health planning and execution. This connection can be conveyed in several ways. For example, the government must update

investors on decision-making in order to maintain clarity. This also allows for investors to feel involved and impactful in the process. As professionals, healthcare workers can speak their concerns and ideas for the betterment of e-health with higher ups so that it can reach implementers like the government who can then enforce an expert approved plan. In turn, it is also important that governments and investors are in communication with healthcare providers to be aware when financial aid for resources need to be provided. Since the providers make decisions and use their field of knowledge for healthcare improvement, the availability of resources translates to an efficient health system, and therefore an efficient health policy [16].

Despite the many benefits to stakeholder interconnection, an issue specific to the USA may be the relationship between physicians and pharmaceutical companies, and the lack of government involvement in between. This is an area where conventional healthcare and e-health share a common challenge. In the USA, having a mixed economy has its advantages and disadvantages in terms of e-health regulation. A major disadvantage is that when setting market prices for medicine, different pharmaceutical companies are able to set their own product prices with minimal government intervention. Additionally, physicians can get compensated for promoting these treatments to patients. This brings a challenge related to affordability and bias which is able to carry on from conventional healthcare to e-health. E-health strives to reduce costs for patients, but high prescription costs is a barrier in achieving this. Many countries such as the United Kingdom (UK) have government regulations on medicine pricing leading to more affordable treatment options than in the USA, but the UK still gains high profits in the pharmaceutical industry. Therefore, implementing a regulated pharmaceutical pricing system in the USA would greatly enhance medicine access and affordability in e-health [17].

2.3. Affordability for Clients and Patients

Affordability for clients and patients plays a tremendous role in the overall growth of e-health over time. As individuals from many different social classes require care, eliminating the obstacle of high monetary values plays a large part in promoting and enhancing inclusive access to healthcare around the world. Through reducing cost barriers for those standing at a lower socio-economic status, the ease of availability will allow for more inclusive, patient-prioritizing services, consequently broadening the range of e-health users. Although the goal is for e-health to be accessible and affordable for all patients and clients, there are obstacles to reach this overall goal [14]. Barriers can include limits to technology, online dependency and trust literacy ability, and economic costs or factors. Barriers limit the reach of e-health as it excludes a considerable portion of the population.

Stakeholder	Role	Interests	Challenges
Healthcare Providers	Deliver care services, implement digital health solutions	Improve patient outcomes, increase efficiency, reduce costs	Upfront investment costs, change management, data security
Patients	Receive care services from providers	Gain valuable health advice and care	Patients' intangible benefits may not create enough economic profit
Government	Enforces and regulates laws, legislations, and policies	Passing efficient regulations to improve society and economy	Critics who demand a non-linear or decentralized government which takes away from efficient policymaking
Investors, Donors, and Private Organizations	Provides funding for projects	Supporting favored projects by investing, market private businesses	High government involvement which limits investors decision-making

Table 1. *Key Stakeholders Involved in E-health Along with their Interests and Challenges Face*

Underprivileged areas, for one, will create a bigger challenge of remaining in budget for patients, as there is less technological infrastructure and less service for internet and mobile coverage all together. These barriers and constraints make it less affordable for those who seek e-health in underprivileged areas [18].

Intervention Characteristics have huge roles in the affordability for clients and patients. Intervention Characteristics are costs associated with implementing the intervention including investment, supply, and opportunity costs. Cost-effective interventions result in a more affordable service so that all patients can have e-health within their budget. Likewise, it can help benefit long term prevention, which helps lower costs over time in chronic disease management [19].

2.4. Investments Opportunities and Return

Some of the major stakeholders within e-health and its growth are governments, donors, and investors. This, in turn, results in multiple parties having a lot at stake with e-health success and distribution. Investment opportunities and returns covers the benefits for future interested parties, and the returns which said stakeholders have within the e-health industry and its growth.

As reliance on technology rises in our everyday lives, so has the demand for e-health and e-government services [6]. Accordingly, e-health investment has also risen, especially in low-middle income countries in the past few years when this technology has been needed the most [20]. Said investments tend to come in large part from governments, and brought upon by multinational action plans or frameworks to provide a consistent and clear-cut way of application and distribution in agreeing states [7]. Another key reason for an uptick in e-health investment has been the COVID-19 pandemic. COVID-19 resulted in common face-to-face and physical medical practices becoming practically impossible, and forced governments to scramble to try to find e-health alternatives [4]. And in accordance with basic economic theory, new firms and different e-health services entered the market to capitalize off of increased demand.

Even though there is great demand for e-health in the modern era [6], with this there come many challenges and barriers to new investors. A lack of information, clear government e-health agendas and frameworks pushes away further investment and creates a strong barrier [3]. Another barrier which has discouraged national and foreign investment in e-health is the lack of information in practical implementation of ICTs within hospitals. As many of said technologies are new and still are in the trial process, mass implementation of many e-health services has discouraged current interested investors [5].

There has been a wide range of ways in which governments impact e-health investment. For example, countries in Europe focus on mass implementation and adoption through private investment in e-health through 'The European health action plan' [7]. On the other hand, other countries have faced different challenges in e-health investment such as the United States. The original implementation of the HITECH Act within the USA [8] has shown a great investment into e-health projects and endeavors, but slow growth in the area projected over the past and next 5-10 years [21].

2.5. Framework for Digital Health in the USA

Digital services are very consolidated in medical care and the introduction of technology in the field can be classified as crucial for providing proper services. Health efficiency depends essentially on health organizations, but mainly on healthcare professionals. These people should have access to adequate resources of study, practice and incentives as well because they are the ones who make most of the decisions regarding health. Consequently, the availability of financial, human and technological resources are necessary to develop efficient health policies and also offer Universal Health Coverage (UHC).

The promotion of UHC itself follows an improvement on health, well-being outcomes and human development. But once any action involves using resources, health has both a social and an economic dimension, the latter influencing the country's oriental health policies. These are needed to achieve improvement on the relationship between quantity and quality, but it is mostly necessary that cost-effective clinical decisions be taken [16]. Due to this fact, reliable data collection like the AMA Digital Research is important to disseminate experts' perspectives, requirements and reasons behind the integration of digital health tools on their typical practices [22].

By inspecting 1,300 physicians during three regular intervals between 2016 and 2022, the survey analyzed huge shifts among physicians towards digital health use and adoption. The number of professionals who find its usage advantageous increased from 85% to 93% (measures taken by professionals from all areas, ages and specialities). Another finding was that there are some influential factors in emerging interest

adoption in digital health tools. They are typically associated with clinical outcomes' improvement, functional effectiveness and stress reduction. However, insurance coverage was the most prominent concern subsequent to privacy and EHRs blending [22].

The configuration implementation of EHR systems with the aid of national government incentive programs was one of the starting points of digital health in the USA [21]. These systems comprehend the digital version of traditional medical records on paper and facilitate many aspects of daily life. The American HITECH act influenced EHRs implementation and aimed to weigh the importance of those as well as improve efficiency, quality, and patient safety [23]. Because of it, its use was and is still very present in American society. However, professional opinion regarding EHRs is variable and complex, most of the physicians relate to the benefits of them, but claim that there should be federal regulations and policies about those. Once physicians are direct stakeholders, they must be future included to plan adjustments of the field considering current needs [24]. Another crucial aspect is security digital network insurance of EHRs. However, offering a secure as well as a functional EHR system is still an obstacle to overcome. Some actions are being done to solutionate such issues and there is actually a growing interest in privacy for EHRs since 2017, typically using blockchain as a strategy [25].

2.5.1. Telemedicine

Telemedicine, which is the monitoring of traditional diagnosis through technology like virtual visits, remote patient monitoring and mobile healthcare, has become vanguard in digital healthcare. According to AMA Digital Health Research, telehealth usage by physicians suffered an exponential growth (passing from 14% in 2016 to 80% in 2022) as well as remote monitoring devices operation (they grew from 12% in 2016 to 30% in 2022) [22]. Since its need was perceived by the private sector and the public comprehend the advantages as well, the use of telehealth in the United States increased around 154% during the beginning of COVID-19 pandemic and were maintained at levels 38 times higher than those of 2019. Its exponential rise happened as a response to medical concerns related to illness spread while striving to ensure healthcare access to patients. Before the pandemic's declaration as a Public Health Emergency (PHE), barriers related to the use of telehealth were associated with regulatory and reimbursement. From a national perspective, providers only received payment for telehealth contact if the patient met the originating requirement - patients who lived in rural areas or areas with shortage of healthcare professionals. Additionally, even patients who filled all requirements could not connect with purveyors from home, they had to dislocate to local providers. Nevertheless, the coverage and payment parity differ depending on government insurance and type of private payer. The situation started to change in March of 2020, when the Centers for Medicare and Medicaid services changed the original site requirement, allowing patients to engage in telehealth from their homes. This was soon followed by state-wide declarations of calamity as well as allowance of private payers and government insurance to work for new ways to assess patients, provide care even beyond state lines, eliminate co-pays of telehealth and ensure payment parity due to the complex situation faced [10].

According to the Centers for Disease Control and Prevention report, over 61 million individuals in the USA have a disability, which means that telemedicine is often adept at attending to the healthcare needs of these individuals, however, in many ways it is often not tailored to be inclusive with all patients [13]. Despite that, telemedicine has significant advantages, including low transportation costs, better medication reconciliation communication, and less exposure to communicable diseases. When projected with an electronic format that considers all conditions experienced by different groups of people, telemedicine has the potential to have a more tangible positive impact than it was previewed. According to the American Medical Association (AMA), if articulated to the right values, digital care can increase the overall health and generate positive impact for society.

2.5.2. Digital Health Literacy

On an individual level, health literacy is the ability in finding, understanding, appraising and using information and services to make decisions related to health. Digital Health Literacy (DHL) in itself, is associated with an individual's ability to interact and use digital technology to understand and apply health information from electronic sources. Digital health literacy measures typically analyze information convention and forget about the importance of technological interaction [26], but previous studies have already demonstrated that an individual's DHL affects their insight into digital health. It means that for those with average to high technological skills, the management of their health through digital artifacts will empower them and also turn out positively as a better health-seeking, health-promoting behaviors, health knowledge and attitudes as a role. Factors like this give certain individuals an advantage to adapting with e-health technology, as seen in Figure 2. On the other hand, for those with lower DHL, there is a link between them and poorer health outcomes, typically

they are also the ones affected by Social Determinant of Health (SDOH) - conditions in which people are born, grow, work or live; they are nonmedical factors with a significance in determining conditions of life [13]. In a hyper connected world, it is important to ensure that the public is getting support on assessment skills and also evaluation skills. Specially because high levels of DHL have been connected with increase in better health behaviors, prevention and even chronic disease control [27] Consequently, programs to reach people about information and practice, considering those with a significant diminished the most, are substantial to meaningful results on digital health.

2.6. Impact of Policy on the Economic Growth of E-health

Positive policy is crucial for the growth of e-health within the economy. Government policies that provide funds for medical and digital devices can lower the risk of entry for smaller providers. Grants and subsidies for purchasing e-health technologies can significantly help the financial burden on healthcare institutions, promoting broader implementation and innovation within the sector [15]. However, policies can also have negative impacts if not well-structured, potentially creating a barrier to entry.

Government policies can promote the impact of e-health by reducing costs associated with healthcare. Increased efficiency can drop costs for healthcare companies and improve patient outcomes. Policies that mandate or incentivize the adoption of fast systems can drive economic growth within the sector [15]. However, it's essential to consider potential unintended consequences, such as the burden of compliance costs on smaller providers.

Economic factors in e-health include policies that ensure equitable access. Creating equal access to e-health can expand the market and grow the economy. By targeting investments in low-income and rural areas, governments can enhance public health outcomes while fostering economic growth [15]. Yet, the potential for unequal benefits must be analyzed to ensure that policies do not inadvertently widen the gap between different socio-economic groups.

Neoliberal policies favoring private business often show a decline in the public sector, favoring technologies that can be scaled at a much greater rate. While the focus on economic growth has decreased poverty, it has also increased financial and power inequities, negatively impacting health outcomes [28]. The analysis could be further enhanced by examining these trade-offs and unintended consequences of such policy frameworks.

Policies on reimbursement, like the reduced rates for telephone-only visits in Ontario, demonstrate neoliberal policy efforts to reduce government spending, which could limit access to digital healthcare across various drug delivery systems [29]. This highlights the need to consider how such policies might impact the broader goals of equity and access in e-health. Exploring the balance between cost-saving measures and maintaining comprehensive healthcare access is crucial for informed policymaking.

2.7. Economic and Financial Challenges

Within the healthcare industry, the implementation of digital health has been seen as a new, cost-effective plan for better care services. Along with issues such as affordability and policy, there are a few remaining factors to be considered. As the e-health plan is taken on, there will be ongoing costs for the systems which include software updates, cybersecurity measures, and technical support. These factors are taken into account for most plans revolving around technology, and can be easily funded by a government, especially the USA as a high-income and financially stable country. However, they are still important to be considered as the importance of data security is discussed later on.

When discussing equitable access, there are many factors to discuss. Firstly, e-health use requires a certain degree of literacy and digital skills [14]. As a very diverse country, the USA has areas of high, low, and adequate adult literacy rate. Many factors such as age, gender, race, socio-economic status, education, and health-insurance coverage determine the ability for individuals to adapt with e-health [30]. There are also disabled individuals who need to be taken into account with mass implementation of e-health technologies. Furthermore, not all healthcare staff have had the training to provide services via a digital format which creates a less effective e-health experience when disabled patients are involved [31]. This raises a significant issue pertaining to quality. Taking into account that e-health may especially be a significant innovation for older individuals, an unpractical interface would take away from the plan’s efficiency aspect. Additionally, access costs, complex pricing for networks, and costly devices create a barrier for the adoption of digital services involving end users [3]. Underprivileged areas will especially have difficulties in adhering with the new costs. For many individuals, this creates difficulty in using remote communication [18]. Studies have expressed that lower levels of DHL among particular groups along with poor internet

access is a major barrier to digital healthcare access [32]. Ultimately, e-health is for the benefit and convenience of patients through efficient innovation. Not having equal rights to access destroys this purpose. Inequity risks implementation failure which would create a burden on the economy. A report from the Good Things Foundation supports this, showing that over 11 million people in the UK lack basic digital skills, translating to a £22 billion loss in revenue due to digital exclusion, or lack of online equity [33].

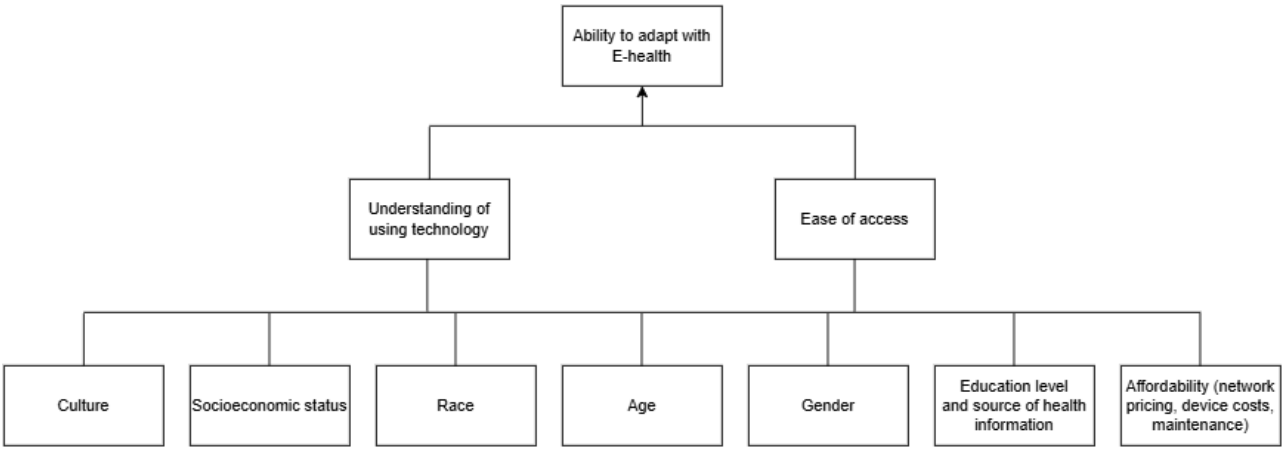

Figure 2. *Factors Impacting an Individual's Ability to Adapt with E-health Technology.*

Social circumstances, as referred to in Figure 2, are very influential because they shape the accessibility and the understanding of e-health. This awareness is fairly important because it enables stakeholders to focus on investment effectiveness regarding the social condition of the society and specifically act assisting advancements that will reverberate in conditions that will provide a basis for e-health development.

Despite all the positive impacts generated with e-health, technology brings new digital threats. However, this is not news as the use of biological sciences within technological spaces has happened since the 1970s [34]. It is therefore important to be aware of these security concerns to strategically and efficiently overcome them. Cybersecurity experts can also be a helpful asset in preventing these digital threats. A major aspect of e-health is electronic health records. They are used by individuals and health organizations to store records more efficiently and reduce health costs. At the same time they raise safety concerns, especially because the data is stored in one place [35]. In turn, these safety concerns have led to patients being reluctant to disclose their health data and seek treatment. This is a negative because it creates distrust and weakens the reputation of e-health. Additionally, criminals target medical data from the EHRs to gain financial and economic benefits [25]. This money making scheme is unethical and creates greater disturbance on the digital platform, posing a risk of financial burden on the government and investors.

3. Discussion

When addressing e-health, we are talking about dealing with patients' health without restrictions of a certain time and place as seen in traditional medicine. Additionally, technology, when properly operated, has the capability to bring and improve healthcare for more people, consequently when considering e-health implementation, it is important to take economic and financial challenges into account. The financial issue will determine whether to keep proper maintenance and get investment funds, however it is not the only thing to work on. The development of the tools has a price, but no matter how much capital it is provided, it will not succeed (or at least not as much as it could) without an aim to social factors. In other words, to get a good return from e-health, people need to have access and knowledge to use digital platforms accordingly to get the best of them. In order to do it, it is important to pay attention to affordability of patients as users of platforms and also promote digital skill knowledge dissemination. Research on e-health (including both its limitations and challenges) is essential to our future as a society and species. Creating new, more efficient systems for a field so important as health and

Challenges	Description	Impact	Potential Solutions
Rising Healthcare costs	Increasing expenditure on healthcare services and technologies, maintenance costs	Strain on healthcare budgets, reduced access to care	Cost-effective digital health solutions, value-based care models
Digital Threats	Security breaches, criminals targeting medical data from EHR records	Distrust from stakeholders towards investing and using eHealth, financial burden on government and investors	Blockchain technology, hiring of the best cybersecurity and digital technology professionals
High Government Capacity	Government is able to implement policies and enforce rules	Investors feel left out in the decision-making process and feel discouraged from funding projects, government provides financing, reduces costs by providing structure and guidance for plans	Create clear policies and regulations to guide both the investors and government into involvement.
Low Government Capacity	Government is limited to carrying out new plans and policies	Less effective policies being enforced, struggle to find solutions to issues and meet citizens' needs, increased costs due to lack of policy	Using communication and collaboration to allow the government to create policies and involving the investors in the process, government needs to have capacity to regulate pharmaceutical pricing
Lack of Equitable Access	Healthcare staff with no training, individuals with low literacy, underprivileged areas, complex network pricing, high device costs	Digital exclusion of large populations translating to loss of revenue, financial burden on economy and disadvantaged individuals	Education through schools, creating policy to train all healthcare staff on eHealth, offering courses and assistance to underprivileged areas and the elderly through local non-profits, libraries, and community centers

Table 2. *Challenges within E-health and their Potential Solutions (Results).*

medicine is only going to benefit our society, which has been shown ever more clearly with the COVID-19 pandemic [4]. Investments in e-health may not only make medical treatments more efficient and cost-effective, but also more affordable in years to come, allowing for greater medical access to people across the globe. The analysis of the limitations and economic impacts of e-health investment must take into account several key factors, such as the challenges that come along with it, governmental intervention, proper implementation frameworks and most importantly, its stakeholders. When we analyze who is affected by investments in e-health and who is actively doing said investment, we can more easily determine the challenges to investment (Table 1 and Table 2). It's also important to determine proper implementation frameworks and how they vary. As we determine that governments are one of the most key stakeholders and drivers of investment as they not only supervise but regulate most other parties involved. Governments must create well-structured, and clear plans on e-health investment to guarantee its future

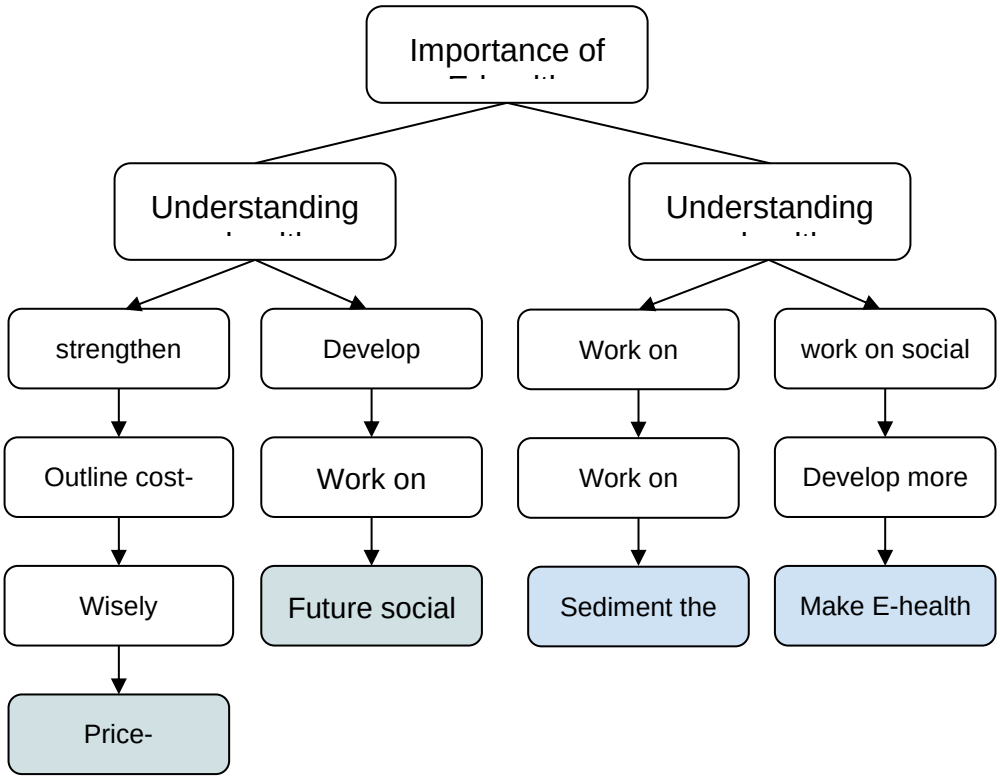

Figure 3. *Importance of E-health Research.*

success through cohesive implementation [3]. This would not only lead to a common understanding and goal regarding e-health, but also solidify care. These are just a few of the many factors which are relevant when we speak about e-health investment.

The understanding of e-health goes beyond its definition or present uses, it is fundamentally related to its social impact. The comprehension of such impact for itself is very dense and requires a series of articles analysis to the obtainment of a brief grasp. Specifically when descanting about singular points, there are typically no entire dissertations about that particular aspect, consequently the researcher needs to get small pieces of information from different sources to provide an accurate evaluation. This was one of the complexities faced by the researchers. Another tangled aspect of thesis topic research is that the results of actions and policy vary depending on which social group a patient is and where it is located. Reverberations are less striking to minorities at times considering different backgrounds. With this study being one of the many studies researching on the economic and financial challenges towards the future of e-health, there are more challenges to be further explored. For example, the tension between stakeholders such as investors and the government was briefly mentioned, but how they impact effective e-health implementation processes can be analyzed. Future e-health research can also weigh the opportunity costs of traditional health care services versus remote e-health options. Finally, a step from effective e-health plans in research to a government-approved innovation needs to be made. The whole point of e-health is to provide an efficient and effective method of delivering care services where health institutions, patients, and other stakeholders such as the government can benefit. E-health should ensure care processes are provided more quickly, accurately, and economically while all patients also receive a quality and better adapted experience [36] [37]. However, this not only applies to the United States because this digitized method of health care assistance most affects the elderly, and the disabled or impaired, groups who are accounted for across the entire globe. Accordingly, the new digital technology could create an inclusive environment applicable to the entire world, including the USA, by 1) involving disabled or impaired people in the design process of e-health, 2) following accessibility guidelines such as ADA and WCAG, and 3) offering training to all health care staff and patients who need it as support [38] [39]. It is important to keep in mind that this innovation should also help the economy. This can be done by weighing the cost of tackling implementation and maintenance costs along with how many people will be using e-health. For example, a certain problem is that e-health use requires a certain amount of literacy and digital skills. For the USA, this isn't as big of a problem and

can be solved by educating children in schools and offering courses and assistance for those who are older. Courses and assistance is something that can be available through local non-profits, libraries, or community centers and wouldn't create too much of a financial burden. Another major problem is data security threats. For this, extra effort in hiring technology professionals and creating security measures should be made. It may be difficult to tackle all problems in the implementation process while making room for economic benefits, but e-health should aim to help most—if not all—of the population.

3. Conclusion

This study gives an overview of the economic challenges, stakeholder involvement, investment opportunities, policy impacts, and affordability regarding the e-health sector. It is noteworthy to mention that the successful implementation of e-health is dependent on several factors. For example, e-health availability is necessary for a proper implementation, therefore maintenance costs and the need for equitable access for disadvantaged groups is one of these factors. As well, effective engagement of healthcare providers, patients, government, and private investors is crucial for the successful implementation of e-health solutions. Stakeholders from all levels are important in enabling resources for effective policy implementation, which generates well-structured projects and meaningful official decisions. Another important factor is the distinct roles, interests, and challenges of each stakeholder group, which not only means that all of them are significantly requisite together, but also that each one contributes to a specific social improvement. Consequently, it is pertinent to clarify those in order to implement actions and strengthen initiatives that relate to the impact of each group. As established previously, e-health is a developing field, and due to this nature, little information is readily available for consumers. One aspect which limited our research was the lack of public and detailed statistics regarding e-health. Examples of these include lack of return on investment for investors and also success rates for government frameworks. Considering this, to gain better insight, future studies could benefit by collecting primary material. Such primary material may include analyses of current e-health adoption within different US states in accordance to social factors and stakeholder involvement, carrying out surveys aimed to discover investor satisfaction and objectives with the e-health project, or taking external observers and unaffiliated parties' ideas. The use of quantifiable data can enlarge policymakers' perspective of the economics of e-health, allow them to grasp how that can impact adoption, and as a result will lead them to handling each challenge systematically in order to lay the foundation for an efficient digital healthcare system. The roadmap for e-health looks bright going forward. It is already revolutionizing healthcare with the further development of technological tools. Through removing present obstacles by means of smart policies, targeted investments, and stakeholder participation, e-health has the potential to enhance health outcomes and boost economic expansion of the healthcare industry.

Author Contributions

A.M., L.D., M.E., R.J., R.M. formal analysis, methodology, project administration, supervision, validation, writing – original draft and writing; A.C., K.D., S.V., conceptualization, writing - review & editing.

Conflicts of Interest

The authors declare no competing financial interests or conflicts of interest.

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