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eHealth in Albanien

Eine Evaluierung des Stands der Digitalisierung des Gesundheitswesens in städtischen Gebieten

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An Evaluation of the State of Healthcare Digitalization in Urban Areas

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Kurzfassung

Hintergrund: Die Einführung von Informations- und Kommunikationstechnologielösungen in der modernen Gesundheitsfürsorge wird als Unterstützung eines digital kohärenten Systems angesehen, dass die Qualität der Versorgung und die Effizienz verbessert. In den letzten Jahren haben bereits zahlreiche Länder die potenziellen Vorteile der Einführung von eHealth-Lösungen erkannt. Selbst in Ländern mit geringeren Gesundheitsbudgets, wie Albanien, sind der Erwerb und die Einführung elektronischer Dienste im Gesundheitswesen wünschenswerte Ziele auf der Agenda der politischen Entscheidungsträger. Albanien hat in den letzten zehn Jahren konsequentes Engagement für die Einführung und Weiterentwicklung von elektronischen Gesundheitsdiensten gezeigt. Die Einführung und Nutzung von eHealth in Albanien ist jedoch noch nicht ausreichend erforscht.
Ziele: Mit dieser Arbeit werden zwei Ziele verfolgt: Erstens soll herausgefunden werden, welche eHealth-Lösungen von Gesundheitsdienstleistern in Albanien genutzt werden, und wie sich der albanische Ansatz mit dem Stand der eHealth-Lösungen in vier anderen kleinen europäischen Ländern, darunter Dänemark, Estland, Nordmazedonien und Slowenien, vergleichen lässt. Zweitens werden die Standpunkte der nationalen Akteure des Gesundheitswesens zum derzeitigen Stand der Digitalisierung des Gesundheitswesens in Albanien dargelegt. Die Überlegungen zielen darauf ab, herauszufinden, welche eHealth-Dienste in Albaniens digitalem Gesundheitsökosystem derzeit effektiv funktionieren und was verbessert werden muss.
Methodik: Um ein Verständnis für das Thema dieser Arbeit zu bekommen, war eine Literaturrecherche unerlässlich. Ebenso wurde ein Vergleich von vier europäischen Ländern mit einer vergleichbaren Bevölkerungszahl wie Albanien durchgeführt. Dadurch war es möglich, die albanischen eHealth-Lösungen mit denen anderer Länder zu vergleichen und mehr über deren Erfahrungen oder Probleme zu erfahren. Darüber hinaus wurden 25 verschiedene Gesundheitsfachleute befragt. Die qualitativen Daten wurden mit Hilfe der Software MAXQDA und des Ansatzes der reflexiven thematischen Analyse ausgewertet, mit deren Hilfe Muster und Verbindungen zwischen den Themen erkannt werden konnten.
Ergebnisse: Albanien und alle vier in der vergleichenden Analyse untersuchten Länder zeigen Engagement bei der Umsetzung nationaler eHealth-Lösungen. Die drei am häufigsten verwendeten eHealth-Anwendungen im öffentlichen Sektor Albaniens sind die elektronische Zuweisung, das elektronische Rezept und die elektronische Krankschreibung, die in der Primärversorgung gut etabliert sind. In den vier Ländern, die wir im Rahmen dieser Studie untersucht haben, waren elektronische Zuweisungen und elektronische

Rezepte ebenfalls zwei der am häufigsten genutzten eHealth-Systeme. Die angebotenen eHealth-Dienste können jedoch nur von den staatlichen Einrichtungen genutzt werden und werden auf nationaler Ebene umgesetzt. Über das offizielle Portal e-Albania können Patienten auf einige ihrer klinischen Informationen zugreifen, darunter auf ihre Krankheitsliste und Maßnahmen oder auf die von ihrem Hausarzt ausgestellten Rezepte und Zuweisungen. Die nationale elektronische Gesundheitsakte wurde bereits implementiert, sie wird jedoch derzeit in den öffentlichen Gesundheitseinrichtungen nicht genutzt. Infolgedessen fehlen in den öffentlichen Gesundheitseinrichtungen auf allen Versorgungsebenen digitale Gesundheitsakten. In Albanien werden die meisten Akten noch immer handschriftlich in Registern geführt und in Ordnern gesammelt, während in Dänemark, Estland und Slowenien die elektronische Speicherung und der Austausch von Gesundheitsakten auf nationaler Ebene weit verbreitet ist.
Zu den Vorteilen der bestehenden eHealth-Lösungen in Albanien gehören nach Ansicht der Teilnehmer*innen Zeitersparnis, höhere Effektivität, schnellerer Zugriff auf Patientendaten, größere Transparenz und eine Verringerung von Medikationsfehlern. Andererseits ist der Zugang für das klinische Personal in öffentlichen Krankenhäusern trotz der Verfügbarkeit einiger eHealth-Technologien eingeschränkt. Hindernisse könnten die fehlende technische Infrastruktur, der Widerstand der Ärzt*innen gegen Innovationen und das Fehlen von Gesetzen und Vorschriften im Bereich der elektronischen Gesundheitsdienste sein, um das klinische Personal zur Nutzung solcher Dienste zu motivieren. Außerdem sind die Privatkliniken nicht Teil der Gesundheitsnetze, sodass kein Austausch zwischen den staatlichen und privaten Einrichtungen stattfindet.
Diese Studie legt nahe, dass Albanien bei der Umsetzung nationaler eHealth-Lösungen Fortschritte gemacht hat, insbesondere in der medizinischen Grundversorgung. Um jedoch den aktuellen Stand der digitalen Gesundheit in Albanien zu verbessern, sollten die Gesundheitsakten digitalisiert werden, was zur Verbesserung der allgemeinen Gesundheitsqualität in Albanien beitragen würde. Die gesammelten Daten könnten die medizinische Forschung verbessern und auch bei der Entscheidungsfindung der Regierung helfen. Darüber hinaus sind politische Initiativen, Vorschriften und Investitionen erforderlich. Der Widerstand des klinischen Personals gegenüber Innovationen sollte hingegen reduziert werden.
Schlussfolgerung: Diese Arbeit kann zu einem besseren Verständnis der derzeitigen Strategie des Landes zur Digitalisierung des Gesundheitswesens beitragen. Die Ergebnisse der eHealth-Lösungen in den anderen vier Nationen können zum Aufbau von Wissen über eHealth-Lösungen aus anderen Ländern und bewährten Praktiken beitragen, um den albanischen Ansatz besser verstehen zu können. Darüber hinaus kann das Feedback der einheimischen Stakeholder den nationalen Entscheidungsträgern im Gesundheitswesen helfen, indem es Ideen liefert, wie eHealth verbessert werden sollte oder was das Gesundheitspersonal bereits bei der Arbeit unterstützt.

Schlüsselwörter: *eHealth, Albanien, Gesundheitsprozesse, elektronische Gesundheitsakten, eRezept, eZuweisung, eKrankschreibung, Entwicklungsländer, Länder mit mittlerem Einkommen, reflexive thematische Analyse*

Abstract

Background: The adoption of Information and Communication Technology solutions in modern healthcare has been seen as supporting a digitally coherent system by improving care quality and efficiency. In recent years, the potential benefits of adopting eHealth solutions have already been recognized by numerous countries. Even in nations with lower healthcare budgets, as Albania, the acquisition and adoption of e-services in healthcare are desirable goals on the agendas of governmental policymakers. Albania has consistently demonstrated commitment to the deployment and advancement of eHealth services during the past ten years. However, the adoption and usage of eHealth in Albania is an understudied subject.
Objectives: This thesis has two objectives: Firstly, it aims to discover which eHealth solutions are being used among healthcare providers in Albania and find out how does the Albanian approach compare to the state of eHealth solutions of four other small European countries, including Denmark, Estonia, North Macedonia, and Slovenia. Secondly, it offers viewpoints from national healthcare stakeholders on Albania's existing level of healthcare digitalization. The reflections seek to identify which eHealth services in Albania's digital health ecosystem are now working effectively and what needs to be improved.
Methodology: In order to get an understanding of the topic of this thesis a literature search was essential. Along with conducting general research on the subject of eHealth, a comparison review of four European nations with populations comparable to Albania's was conducted. As a result, it was possible to compare Albania's eHealth solutions to those utilised in other nations and learn more about their experiences or issues. In addition, 25 different health practitioners were interviewed. The data was analyzed by using the MAXQDA software and applying the approach of Reflexive Thematic Analysis, which helped to identify patterns and connections between the topics.
Results: Albania and all four of the countries investigated in the comparative analysis demonstrate engagement in implementing national eHealth solutions. The three most widely utilized eHealth applications in Albania's public sector are eReferral, ePrescribing, and eSickLeave, which are well-established in primary care. In the four nations we reviewed in this study, eReferral and ePrescribing were two of the most frequently used eHealth systems as well. The eHealth services that are offered can only be accessed by the governmental institutions and are implemented nationally. Through the official portal e-Albania, patients can access some of their clinical information, including a list of diseases

and recommendations or prescriptions and referrals issued by the general practitioners. The national electronic health record has already been implemented, however it is not currently in use in public healthcare facilities. As a result, public healthcare facilities lack digital health records at all levels of care. The majority of the records still remain handwritten in registers and are gathered in actual folders in Albania, while in Denmark, Estonia, and Slovenia the practice of storing health records electronically and exchanging them nationally is widespread.
Based on the participant's reflections, the benefits of the existing eHealth solutions in Albania include time savings, increased effectiveness, quick access to patient data, increased transparency, and a decrease in medication errors. On the other hand, despite the availability of some eHealth technologies physician access is restricted in hospital settings. Barriers may pose the lack of technical infrastructure, physicians' resistance to innovation, and a lack of eHealth government legislation and regulations for enforcing or motivating the physicians to use such services. Moreover, the private clinics are not part of the healthcare networks, so there is no interaction between the governmental and private facilities.
This study suggests that Albania has made progress in implementing national eHealth solutions, particularly in primary healthcare. However, in order to improve the current state of digital health in Albania, the health records should be digitalized, which would contribute to the enhancement of the overall health quality in Albania. The data collected could enhance medical research and help in governmental decision-making as well. In addition, political initiatives, regulations, and investments are required. On the other hand, the resistance of clinical staff to innovation should be reduced.
Conclusion: This thesis can contribute in a better understanding of the country's present strategy for digitalizing healthcare. The results of the eHealth solutions in the other four nations can contribute to building knowledge about eHealth solutions from other countries and best practices to better understand the Albanian approach. Additionally, the feedback from domestic stakeholders can help national healthcare policy makers by providing ideas of how eHealth should be improved or what is already assisting healthcare professionals in their work.

Keywords: *eHealth, Albania, healthcare processes, Electronic Health Records, ePrescribing, eReferral, eSickLeave, developing countries, middle-income country, reflexive thematic analyse*

Contents

List of Acronyms

The following list describes the abbreviations and acronyms used throughout the thesis. The page in which each one is first used is also given.

CHAPTER 1

Introduction

This chapter will introduce the topic and the scope of this master's thesis by briefly describing the problem statement, the research questions, and key findings. The structure of this work is presented in the last section.

1.1 Problem Statement

The life expectancy has rapidly increased over the past few decades, and despite the rise in Non-Communicable Disease (NCD) cases, the major drivers of this longevity revolution are efficient modern medical therapies and disease prevention. The population's need for a more effective and equitable healthcare system has grown through time, along with healthcare costs. Additionally, contemporary globalisation and modern medicine necessitate strong coordination and cooperation between the many healthcare providers, such as primary health centers, hospitals, emergency services, or pharmacies, at both, national and international levels. Due to the rising medical specialisation and healthcare complexity in today's world, many individuals receive medical treatment from many facilities that practise various medical specialties. The need for access to cross-border healthcare is growing as some patients travel abroad to receive more advanced medical care or lower service costs, a practise known as "Medical Tourism" [1].
Additionally, collaborating with patients is crucial for fostering trust and compliance, which in turn promotes patient engagement and adherence in contemporary treatment, as noted in The Lancet [2]. Therefore, it is essential to provide patients with access to health information and listen to their opinions in order to empower them and improve the quality of care as a whole.
Digital solutions have been used in a variety of settings and fields in the healthcare sector during the past 20 years in order to address these difficulties, improve patient outcomes, and promote economic and research efficiency.
The application of digital services in healthcare is known as Electronic Health (eHealth).

In 1999, John Mitchell used the phrase "eHealth" for the first time in a publication, defining it as *"a new term needed to describe the combined use of electronic communication and information technology in the health sector"* [3, 4].
The significance of eHealth has been recognized by the World Health Assembly (WHA) since 2005 [5]. By that time WHA adopted an eHealth resolution with the slogan "eHealth for All by 2015", referring to Alma-Ata Declaration "Health for All" (1978) [6]. WHA urged hereby the Member States to enhance the technical framework for healthcare and create a long-term strategic plan to require and implement digital health technologies [7].
In a recent article titled "Global Strategies on Digital Health by 2020–2025", published by World Health Organization (WHO) the four international strategies "Global Collaboration and Knowledge Transfer", "Implementation of National Digital Health Strategies", "Global, Regional, and National Digital Health Governance", and "Human-Centered Health Systems" were defined [7]. These health guidelines propose that in order to accomplish regional, national, and international collaboration with the goal of improving patient and global health outcomes, it is crucial for all nations to deploy human-centered eHealth services. Developing an eHealth infrastructure may be more difficult in nations with smaller healthcare spending, such as Albania, though.

This thesis aims to particularly evaluate the state of healthcare digitalization in Albania, which is an understudied topic. With a population of about 3 million, Albania is a tiny, centrally-planned country with an upper middle-income status (as defined by the World Bank) [8]. It is situated in Southeast Europe and the Western Balkans and has a 362 km coastline to the Adriatic and Ionian seas. The country, which is divided in 12 prefectures, belongs to the United Nations (UN), WHO, North Atlantic Treaty Organization (NATO), Organisation for Security and Co-operation in Europe (OSCE), World Bank, and since 2014, it has been an European Union (EU) candidate country [9]. Due to its high levels of internal and external net emigration, the nation suffers from brain-drain [10, 11]. According to the Euro Health Consumer Index for 2018, Albania was ranked 35th, being left behind of other European nations in terms of "consumer friendliness" [12]. Contrarily, the life expectancy of the population is high [13] even though Albania has poor healthcare resources, with a health expenditure of 5,23% of Gross domestic product (GDP) (2018) [14] and 1,6 physicians per 1000 inhabitants (2019) [15]. According to Worldometer [13], the life expectancy in 2020 was 77,5 years for men and 80,5 years for women. The healthcare system in Albania is mostly public and concentrated in the capital city, Tirana [16].
Albania has demonstrated ongoing commitment to eHealth service implementation over the past ten years and has successfully navigated a digital transformation by expanding the "e-Albania" e-government platform, which enables citizens and businesses to access all governmental services online [17].
Multiple articles claim, that a national Electronic Health Record (EHR) was deployed in public healthcare providers [18, 19, 9], but the state of eHealth may have changed given that digital health is a field that evolves and needs significant resources for maintenance and further developments.

To the author's knowledge, there is also a lack of documentation in literature describing the local healthcare players' perspectives on the state of healthcare digitization.

Consequently, the goal of this thesis is twofold:

- First, it aims to assess the state of eHealth services in Albania's urban areas and compare it to the state of eHealth solutions of four other small European countries, including Denmark, Estonia, North Macedonia, and Slovenia.
- Second, to indicate the reflections and perspectives of domestic healthcare stakeholders regarding the level of healthcare digitalization among healthcare providers in the nation, in order to identify the benefits, possibilities, issues, and challenges of the exisiting national eHealth solutions.

In order to first acquire results, a crucial methodology was literature search. Along with conducting general research on the subject of eHealth, a comparison of a few European nations with populations comparable to Albania's was conducted. As a result, it was possible to compare Albania's eHealth solutions to those utilised in other nations and learn more about their experiences, problems, or lessons gained. Additionally, it was necessary to consult national healthcare stakeholders with the theme under consideration. As a result, 25 participants were interviewed in four Albanian cities. With predetermined open-ended questions, we conducted a semi-structured interview. The interview guide we used is included in Appendix A 8.2. This approach assisted in maintaining attention on the thesis's research questions. On the other hand, due to the flexibility of semi-structured interviews, it was possible to ask spontaneous inquiries to explore a subject in detail when necessary. The qualitative data analysis software MAXQDA was used to analyse the acquired data using the reflexive Thematic Analysis method. In order to produce a better presentation of the results, this methodology assisted in finding patterns and connections between the topics through the coding of the data. The research questions for this thesis are introduced in the section that follows.

1.2 Research Questions

We defined the following three primary research questions for this thesis:

- **RQ1**: Which national eHealth solutions are available in Albania?
- **RQ2**: How does the Albanian approach compare to the national eHealth strategies of other small European nations?
- **RQ3**: What are the reflections of domestic healthcare stakeholders on the current state of eHealth in Albania?
  - Do healthcare professionals use the computer and what for?

- What are the benefits?
- What are the possibilities?
- What are the issues?
- What has to be improved?

1.3 Key findings

This thesis contributes in a better understanding of the current Albanian approach in digitalizing healthcare by describing the eHealth solutions being used in Albanian Healthcare Provider (HPO)s and comparing it to other European nation's approach. Additionally, it presents Albanian healthcare stakeholders' perspectives on the state of eHealth in the nation. This study revealed that Electronic Referral (eReferral), Electronic Prescribing (ePrescribing), and Electronic Sick Leave (eSickLeave) are the most prominent used eHealth services in Albania. The available health documents are electronically signed with Electronic Signature (eSignature) and uploaded in the patient portal e-Albania. The aforementioned existing eHealth solutions are now commonplace and well-established in primary care. Accordingly, during patient interactions, computers are frequently used in the health centres.
The most frequently reported benefits of the current eHealth services in Albania were time-saving and higher patient and healthcare professional's satisfaction. Additionally, the use of eHealth services promotes transparency, reduces abuses, and generally increases reliability, whilst ePrescribing reduces medication errors.
On the other hand, the level of digitalization among physicians in public hospitals remains low and the national EHR is currently not operating in public HPOs, which results in lack of digital health records. In other European countries, such as Denmark, Estonia, and Slovenia the health records are widely exchanged among healthcare institutions. Other reported issues and challenges of eHealth in Albania include the lack of technological infrastructure, the mindset of the clinicians, which leads to resistance using technology, the system outages, and lack of regulations. A higher percentage of electronic health records are used in private institutions. Private clinics, however, are not a part of the healthcare networks, which results in incomplete health data when generating national reports.
In order to address the aforementioned concerns about the digitalization of Albanian healthcare, the participants proposed a number of actions that could be taken, including the digitalization of health records as a crucial step, workflow integration, technology adaptation, as well as political initiatives and investments. In addition, the physicians need to collaborate more and be accepting of technology.

1.4 Structure of Work

The thesis is composed of nine chapters and has been organised in the following way.

Chapter 1 briefly introduced to the topic of the thesis, the research questions, and contributions. The following chapters will provide further descriptions and analysis of the topic in focus.
Chapter 2 consists of the results of the literature research. It deals with some common eHealth services, their benefits, issues, and successful adoption. In addition, it reports the experiences of some countries who have adopted the analysed eHealth solutions based on literature, describes some technical aspects of eHealth, and some innovation barriers in healthcare.
In **Chapter 3** we will then describe the methodological approach we used, in order to accomplish the purposes of this thesis, including the studied literature and other references used, as well as how the qualitative interviews were conducted and evaluated. It also contains a table with some participant's demographic characteristics.
In **Chapter 4** we will take a look to eHealth solutions in four other European countries of similar population size as Albania, the lessons learned and their experiences based on literature research. The countries we reviewed are Denmark, Estonia, North Macedonia, and Slovenia.
Chapter 5 will introduce the digital development in Albania, the Albanian national healthcare system, and some healthcare and eHealth projects in Albania according to articles and literature research. Moreover, it will present governmental plans for enhancing the digital health in Albania based on the national health strategy 2021-2030.
Chapter 6 comprises the results of the interviews with the participants. The chapter describes the existing national eHealth solutions and the reflection of the involved participants, regarding the benefits, issues, and possibilities of the existing solutions. In addition, it reflects the improvements which need to be undertaken based on stakeholder's perspectives.
In **Chapter 7** we will then discus the results by conducting similarities and differences of eHealth aspects of Albania compared to the experience from other countries or literature reviews.
The last chapter, **Chapter 8** summarizes the main findings of the thesis and provides a final comment of the main areas covered in this work. Furthermore, it describes the limitations of this study and gives suggestions for future work.

CHAPTER 2

Literature Review

This chapter describes some basic information about the Medical Record Documentation, eHealth, their advantages, shortages, and some technical aspects of eHealth. Furthermore, as stated in the introduction, Albania has been a candidate for membership in the EU since 2014. As such, it is critical to learn about EU rules and the condition of cross-border eHealth implementation in the European region. Because Albania has limited healthcare resources, it is critical to look for patterns and additional difficulties, which developing countries may face. Additionally, various e-health tools, including EHR, eReferral, Electronic Appointment (eAppointment), and ePrescribing, should be evaluated in light of their advantages and disadvantages as well as the geographic areas in which they are offered. Some of these eHealth solutions will be looked at in the context of Albania throughout the study. Thus, in order to aid comprehension, they will be covered in more detail in the parts that follow. Some challenges to healthcare innovation will also be discussed in this chapter in order to comprehend the obstacles that Albania is currently facing in the implementation of the eHealth solutions.

2.1 Medical Record Documentation

The healthcare sector is characterized by its information-intensive and knowledge-demanding nature with large amount of data [20]. Leiner et al. noted that an average university hospital produces about 6 million documents per year, which in a paper-based environment is equivalent to a 1500 meter high stack on clinical papers [21].
The Medical Record Documentation (MRD) is defined as the collection, organisation, exploiting and storage of information and knowledge [21] and is of high importance to patient care in healthcare [22].
Hippocrates, who lived in ancient Greece and is known as the "Father of Medicine" has already drown attention to the importance of recording patient information [23].
Medical records were traditionally documented on paper and maintained in folders with

the intention of later usage [24, 21].
There are multiple purposes for recording the medical information, such as clinical goals, controlling, reimbursement, legal issues, research, and quality management, to name a few. The documentation of health records should serve "logistics of information and knowledge, because only authorized persons should be able to access this information and knowledge at the right time in the right place and in the right form" [21].
Furthermore, MRD aims to support decision-making on the treatment of the patient, the communication and continuity of care, organisation, training of students and residents, and serves as a reminder of the medical history and the undertaken procedures [21].
The MRDs can be hand-written or computer-generated, typed or dictated, digital or traditional X-Ray. Nowadays, they are mostly stored digitally. *"A document is a more or less structured summary of individual data and serves to place the data in a context that is necessary for a specific task"* [21]. In healthcare a variety of documents are used for purposes of MRD, including fever curves, doctors' letters, consultant's reports, admission forms, medical history forms, diagnostic reports, laboratory requests [21].
Independently of the storage medium, it is important that the clinicians follow guidelines which ensure a comprehensive documentation of patient information, which inter alia in case of legal issues would verify the delivery of care [22].
Some principles of good MRD are the completeness, accuracy, legibility, confidentiality, and chronological order [25]. The documentation should include information about all patient contacts, allergies, diagnoses, medical history, results of x-rays, lab tests, and other services, referrals, consultations, treatments, and medication [26].
Nowadays, the majority of medical records are kept electronically; this field is known as eHealth, and it will be introduced and detailed in the following section.

2.2 Reviewing eHealth

eHealth is a new way for healthcare professionals to interact with their patients by leveraging care accessibility. It delivers services independent of time and place and helps professionals make better decisions by enhancing the care quality.
The term eHealth can be traced back to a publication by John Mitchell in 1999, where it was defined as *"a new term needed to describe the combined use of electronic communication and information technology in the health sector. The use in the health sector of digital data—transmitted, stored, and retrieved electronically—for clinical, educational, and administrative purposes, both at the local site and at a distance"* [3, 4].
Since then, the term is frequently used in the academic setting, by individuals or organisations, but to date there is no consensus about the definition of eHealth [27]. Moreover, the terms eHealth, EHR, telemedicine or health telematics are often used interchangeably and without precision, although there is only overlap in definition [28].
Oh et al. identified 51 unique definitions used for eHealth [4].
WHO defines eHealth as *"the cost-effective and secure use of information and communications technologies in support of health and health-related fields, including health-care services, health surveillance, health literature, and health education, knowledge and re-*

search" [29, 30]. Gunther Eysenbach uses the term to refer to *"an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology"* [31, 4].
According to Eysenbach, the "e" in eHealth stands for a number of other "e"-s as well, including efficiency, enhancing quality, evidence-based, empowerment, encouragement, education, enabling, ethics, equity, which represent some advantages of eHealth. eHealth should also be simple to use, enjoyable, and exciting, according to Eysenbach [31].
Due to the diversity of eHealth definitions, we will use the Eysenbach's concept for the purposes of this study. This term emphasises the necessity of cross-institutional collaboration and a global data interchange. Additionally, it highlights the multiple disciplines involved in the thematic area of eHealth.
Some examples of eHealth applications may be the electronic communication between a doctor's office and a laboratory or radiology institution or pharmacies. A cross-institutional EHR where the different facilities can exchange patient information has the potential to improve patient care and increase efficiency [32].
Some of the most well-known eHealth services in a clinical setting include EHRs, eReferrals, and ePrescribings, which will be covered in the following sections.

2.2.1 Advantages of eHealth services

As mentioned in the introduction, eHealth solutions have the potential to address the challenges caused by the increased number of NCDs, ageing society and the increased budget needs in the healthcare realm by providing ways to enhance the delivery of care. In addition, the e-services in healthcare have the potential to support a digitally coherent system and enhance patient care.
The electronic health systems have become pervasive in the healthcare realm and are considered to be "the need of the hour" or "the cornerstone of a modernised healthcare" [33]. Inter alia, they can improve patient outcomes, enhance access to health information with higher accuracy, reduce medication errors and healthcare costs, support and promote the cooperation and communication between healthcare providers by being able to share information available in different places at the same time, increase immunization rates, achieve life-saving outcomes with monitoring, and reduce the double handling by contributing in time and space savings [34, 35, 36, 37].
eHealth solutions also affect healthcare in rural communities by allowing online communication between the medical experts, who may be geographically dispersed [38].
Further, they have the potential to give the patients access and control of their own health data and support patient involvement in the decision-making of the treatment and contribute to health literacy improvements [39]. In 2009 WHO called for action to improve the health literacy by implementing health literacy interventions in low- and middle-income countries, as it is important in the person-centered care [40].

Moreover, digitalization in healthcare has a significant contribution in research by enabling data analysis and evaluations like epidemiological reports, as well as popular or public health [35, 41].

2.2.2 Challenges of eHealth services

Besides being so advantageous, the eHealth services still have to struggle with some challenging issues and hazards, which may pose barriers in making use of their advantages. Some challenges consist of the complexity of the healthcare environment, lack of interoperability, patient safety issues, bad user experience design or poor usability, which can produce cumbersome and time-consuming processes and are related to clinician burden [42, 43, 44, 45]. Privacy, security, and concerns about data ownership are some other issues in the field of eHealth [46]. Moreover, the societies in low- and middle-income countries may face additional challenges in the eHealth implementation, mainly consisting of the limited material and human resources [47, 36]. Funding is one of the most important barrier when implementing the national EHR [48]. In addition, the resistance of the physicians is considered as a fundamental threat, together with the absence of strategic planning [49].

2.2.3 Technical Aspects of eHealth

In the eHealth landscape, there are also some challenges of a technical nature, including interoperability, the management of big data, security, and data protection. Nowadays, there exist some technical solutions that aim to address these hazards. These aspects will be described in the following paragraphs and contribute to a better understanding of the Albanian eHealth infrastructure.

Interoperability

One of the most important challenges remains in achieving interoperability among healthcare systems. Nevertheless, it is critical to implement systems able to communicate to systems in other healthcare providers, and share information with other healthcare professionals and the patients. In order to obtain interoperability it is important to agree on common rules, including the content codes or standards for exchanging and managing clinical documents across institutions.
The initiative Integrating the Healthcare Enterprise (IHE) is an international non-profit organisation, which was consolidated in the US and is a widely used system architecture [50]. It specifies integration profiles and standards for structuring the data and achieving interoperability across different healthcare systems. The integration profiles build the foundation of the technical architecture [50]. The profile Cross-Enterprise Document Sharing (XDS) is critical in IHE, as it specifies the required components for a seamless exchange of medical documents. The required components include "Document Sources", "Document Consumer", "Repository", "Registry", "Metadata", and "Patient Identity Source". "Document Sources" comprises systems responsible for generating documents.

"Document Consumer" defines applications for retrieving the documents. "Repository" defines the services that save the documents. "Registry" is the database that stores and manages information about the documents (metadata). Metadata consists of around 40 data fields, including data about the author, the institution of issue, document type, and date of creation. The "Patient Identity Source" is responsible for the transmission of patient data to the registry. "Affinity Domain" is the network that is created by such an architecture. [50]
In order to achieve international interoperability, it is important to implement IHE-conform national EHRs. The member countries participating in IHE Europe are Austria, Finland, France, Germany, Italy, Spain, Switzerland, the Netherlands, Turkey, Luxembourg, and the United Kingdom. The vendor co-chair of IHE Germany, Alexander Ihls, suggests that it is important to consider some aspects when implementing IHE nationally [51]. Firstly, it is critical to determine national specifications for the metadata. Furthermore, some specifications should be performed by the participating institutions and others by the patients or their representatives. [51]
In addition we need standards, which specify the structured health data to achieve semantic interoperability. Some prominent standards handling the exchange of clinical data and documents include Health Level 7 (HL7) v2, HL7 v3, HL7 Clinical Document Architecture (CDA), HL7 Fast Healthcare Interoperability Resources (FHIR), [52] ISO/EN 13606 [53], and openEHR [54]. HL7 is a group of defined international standards, used in order to exchange health data across institutions. HL7 version 2 and 3 are used, in order to exchange messages between institutions. They consist of segment types and patient data [52]. HL7 CDA and HL7 FHIR are used for exchanging structured documents. HL7 CDA specifies the structure of document [52]. It comprises of classifications and code systems, in order to achieve seamless communication to other systems. HL7 CDA, ISO/EN 13606 and openEHR apply the dual architecture model, consisting of Archetypes (First Layer), which describes the content/classes and Reference Model (Second Layer), which describes how the classes have to be assembled. The exchange format used for these standards is Extensible Markup Language (XML) [54] [53] [52].

Big data

Another challenge consists of handling the large amount of data in healthcare, which was diversified with the advancement of technology. The big data in healthcare is generated i.a. from digital health records, results of medical examinations, mobile health, devices that are part of internet of things, or biomedical research [55]. Analysing these data and generating meaningful information is of special interest particularly for public health authorities or healthcare providers, as it is critical to achieve a better organisation and enhance the outcomes [55]. However, in order to find the relevant information among the large amount of healthcare data and prevent overload, this requires special methods and technically advanced applications, especially when considering the unstructured data.
Some solutions for handling the big data in healthcare include applying artificial intelligence techniques or machine learning methods, including the Natural Language Processing technique for enhancing speech recognition and identifying "key structures

in free text" [55]. In addition, there are multiple tools, which support in medical image analysis and processing [55]. The most common open-source distributed framework for storing and managing big data include Apache Hadoop and Apache Spark, which also support machine learning techniques [55].
However, there are still some challenges with the big data, such as the storing, accuracy, security, or the diverse format of the data [55].

Data protection and security

Another hazard consists of data protection and security. A new approach to address the security issues promises the blockchain technology.
A blockchain is a data-structure which is essentially a chain of blocks [56]. Every block contains its data and meta information like a time-stamp of creation and hash of the previous block [56]. The blockchain is persistent, which means it is unchangeable and old blocks are kept on the chain forever. It is also transparent, which means that every participant can see the data (which can be encrypted) and it is decentralized, which means there are multiple copies saved at multiple locations [56]. So, there is no need to trust a single central organization for its integrity [57].
One of the first examples of public blockchains was Bitcoin, a currency which uses the blockchain technology to be safe and decentralized.
In healthcare it is of high importance to maintain the patients privacy, but at the same time to have the interoperability between the involved healthcare institutions and also between every involved healthcare device [57]. At the moment, they often use different databases and interfaces. Other important points are the data integrity and the authorization of who can see and edit the patient data [57].
There are two types of benefits of blockchain in healthcare.
The first ones are patient-related benefits. Blockchain improves the security of the stored patient data with a decentralized peer-to-peer network [56]. It also provides the involved health care institutions to share the patient records and improve the patients treatment in this way [56]. By being a blockchain, we also have stored timestamps and the patient's history is available for the doctors to see, which also helps with the treatment [56].
The other benefits are organizational-related benefits. Multiple studies [56] show that decentralization immensely assists in the exchange of healthcare information between the organizations. Another benefit is, that the blockchain makes the pharmaceutical supply chain transparent and can help to reveal counterfeit drugs. Furthermore the blockchain enables a better management of medical insurances [56].
However, there are also some threats of blockchains in healthcare, which should be considered.
Firstly, there are technical threats like the scalability and the energy consumption of bigger blockchain networks. But there are also security issues such as domain name system attacks or mempool attacks [56].
Secondly, social threats, namely the decentralization, makes it hard for legal authorities to access the data [56]. In addition, there is a lack of regulations and guidelines [56].

To conclude this section, interoperability, large data, and data protection are some of the technical problems in digital health. In order to guarantee system interoperability, it is crucial to utilise international standards. The analysis of healthcare big data frequently includes the promise of artificial intelligence methods. The public health authorities or healthcare providers are particularly interested in the big data. Issues with data protection can be resolved by utilising the new method of blockchain technology.

2.2.4 eHealth in Europe

The digitization of medical records has grown since 2009 and has now become a widely adopted practice in the healthcare facilities of Europe [55]. The WHO Europe initiated a survey regarding eHealth in the WHO European Region. In response to the question of whether their nation has a shared EHR system 59% (27 out of 46) of the countries replied with YES [18]. According to 50% of the countries, funding was the most important barrier when implementing the national EHR [48], while 70% of the countries confirmed to have a national eHealth policy or strategy [48].
Nevertheless, although the EU states have progressed in implementing national eHealth systems, their services are not unified, which hampers the exchange of health information with other states. The European Directive 2011/24/EU aimed to establish rules, in order to apply the patient's rights in cross-border healthcare [58, 59]. Therefore, there have been efforts from the European Commission to enable a cross-border exchange of health services and provide a common Information and Communications Technology (ICT) infrastructure, which started in 2008 with the pilot project European Patient Smart Open Services (epSOS). epSOS aimed to exchange Patient Summary (PS) and Electronic Dispensation (eDispensation) between EU countries. epSOS was followed by the European Health Data Space, so-called eHealth Digital Service Infrastructure (eHDSI), which investments are estimated to be 1 billion € [59]. Currently, eHDSI provides two main services: the ePrescribing/eDispensation service, which interlinks the national prescribing systems and the PS, which exchanges the basic set of patient's medical data, including allergies, the current medication, previous illnesses, and surgeries from State A to State B [60]. Moreover, a long-term plan is to exchange other clinical documents, the so-called Original Clinical Documents (OrCD) in the original language. The documents include laboratory results, discharge reports from hospitals, and medical images [60]. Two important aspects of eHDSI consist of providing comprehensibility and authentication of patients and healthcare providers [59]. The first concept aims to provide information in the healthcare professional's native language for the two available services, which is realised through mapping of the data between the two participating National Contact Point for eHealth (NCPeH). The type of patient's authentication is defined by the native country of the patient (State A) and should be entered by the the treating healthcare provider abroad (State B). [59] The eHDSI project was followed by the EU4Health program, which was adopted as a result of pandemic and will last until 2027 [61]. The participation of the countries in using these services is currently voluntary [59].
Bruthans and Jiráková [59] investigated the current usage of eHDSI among European countries. The authors found out that the number of countries with operating NCPeH

has increased from the fourth quarter of 2019 to ten at present. Most eHDSI transactions occurred between Estonia and Finland, while most of the transactions between these two countries consisted of the exchange of ePrescribing/eDispensation services. The high number of transactions between these two countries can be explained due to the frequent travels. Croatia and Portugal also use the ePrescribing/eDispensation service actively. In addition, the authors stated that the PS can be currently exchanged by eight countries (Croatia, Czech Republic, Finland, France, Malta, Portugal, and Spain), while the OrCD is not yet operational in any country. The authors concluded, that a more widespread usage of the European Health Data Space will still take some years [59].
Key recommendations from the surveying data of the WHO Europe consisted on the need for political commitment, the development of national eHealth strategies, legislation on EHR, adaption of standards, regulations in mHealth, as well as increasing digital and health literacy among healthcare professionals and citizens, in order to reduce the eHealth inequalities and achieve successful adoption in eHealth [48].

To conclude, significant investments and initiatives have been made to enable the exchange of health services across borders between EU states [55]. However, it will take some time before the European Data Health Space is widely adopted and accepted among all the European country members [59].

2.2.5 eHealth in Developing Countries

Because of their tremendous benefits, eHealth solutions are being implemented even in countries with lower healthcare budgets.
However, in 2006 WHO stated that many developing countries "remain at the starting gate" of the EHR implementation [34], while in 2012 WHO found out in a global survey that “countries in higher income groups have higher adoption of EHR” [35]. According to this survey, in 2012 70% of the developed countries (including high-income and upper-middle-income countries, as defined by the World Bank) use an electronic system in the health sector, whereas in developing countries only 40% [35].
According to Fraser et al. [47] some benefits of EHRs in the developing world consist (similar to developed countries) in legibility improvement of clinical notes, prescription of drugs and administration of vaccinations, warnings for abnormal laboratory results, reporting outcomes, budgets and supplies, support for clinical research, and allergy warnings.
On the other hand, multiple studies have described the weaknesses, which developing countries may additionally face while implementing an eHealth infrastructure, by particularly emphasising the lack of resources in an environment with limited health budgets and limited professionals, which again enforces the need for designing user-friendly systems [49]. The developing countries suffer from brain-drain, which consequently result in lack of skilled labour. In addition, urbanisation may drain experts away from rural to urban environments, an issue where telemedicine can counteract by supporting patients living in rural areas. [49]
Another challenge when adopting eHealth solutions is the physician’s resistance towards

new technologies [49]. Shahmoradi et al. [49], who analysed the SWOTs of EHR Implementation in Tehran University of Medical Sciences, considered the resistance of the physicians as a fundamental threat, together with the absence of strategic planning.
On the other side, Herlambang et al. [62] measured the readiness of the clinical staff at one of the academic hospitals in Indonesia by using quantitative methods, whereby the participants showed a positive attitude on using the EHRs and did possess computer skills, but they did not have enough knowledge about the terminology of EHR and its goals.
The 2012 WHO eHealth survey predicted some trends in the health sector and described some challenges developing countries may additionally face [35].
According to this survey, it is important to not neglect the deployment and maintenance of EHRs in developing countries, and enable the communication to other systems, as there is a need for a data exchange link between developing and developed countries, inter alia during pandemics.
Thus, due to new viruses or new infection diseases, eHealth solutions may require flexible structures and disease surveillance systems will be necessary, also in developing countries. COVID-19 has indicated that pandemics must be considered as a global issue, and not as a local one.
Another trend may consist in the increasing role of the private sector in patient treatment. So, private facilities should be part of the healthcare networks, in order to be able to exchange information with facilities in the governmental sector and achieve higher levels of data completeness [35].
Furthermore, primary healthcare is considered of high importance for achieving 'efficiency', equality', and 'resilience' in health systems [63]. In fact, the importance of the primary care was emphasised since 1978 in the Alma-Ata declaration, where it was said that primary healthcare "is the first level of contact of individuals, the family, and community with the national health system bringing health care as close as possible to where people live and work, and constitutes the first elements of a continuing health care process" [6].
In 2009 a study conducted from Vital Wave Consulting [36] and sponsored by Gates Foundation investigated the state of the digital health in the developing world and showed some common constrains of hospital information systems in these countries.
Firstly, the researchers determined that in the developing countries there exist multiple systems rarely integrated to each other. Secondly, they observed a low incentive to collaborate on data sharing. Thirdly, the private sector may be neglected as a source for providing health data, so data is only shared between public facilities and there may be discrepancies between the systems. In addition, EHRs may be time-consuming, duplication and fragmentation in data recording exist, and data flows in one direction from bottom to the top, so that the healthcare workers do not directly benefit from the data they must collect.
However, Fraser et al. [47] noted in their study that the implementation of EHRs may be a challenge in high-income countries as well. The researchers stated that "some settings in the developing world have similarities to those in European or US healthcare

environments, so similar software can be used" [47].

In conclusion, eHealth is being used in less developed countries as well, much like it is in developed ones, to improve patient outcomes. However, developing nations could also confront issues including a lack of funding for healthcare and resources [49]. Vital Wave Consulting observed little incentive for sharing data and collaborating in the developing world [36]. This section also discussed WHO's recommendation to integrate the private sector into eHealth networks due to the growing contribution of the private sector to patient care [35].

2.3 Reviewing the eHealth solutions

The most popular eHealth services will be discussed in the following subsections, together with their benefits, drawbacks, and best practises for adoption. Additionally, certain countries who have already adopted the various solutions will be mentioned, along with their practises. As noted above, this research aids in a better understanding of some of the eHealth solutions used in Albania and can be used to compare the common advantages and difficulties with those mentioned by the study participants. It also helps to comprehend the factors that contribute to the successful adoption of such services, which can be used to compare with the Albanian strategy.

2.3.1 Electronic Health Records (eHealthRecords)

The ambiguous eHealthRecords or EHRs are digital repositories of health records, which contain inter alia patient and clinical health information. Their deployment started in the 1960s and 1970s when computer technologies were developed [24]. Nowadays, computers are ubiquitous in the healthcare ecosystem [24]. EHRs "can be used for the digital input, storage, display, retrieval, printing, and sharing of information contained in a patient's health record" [64]. In addition, these systems can contain knowledge on allergies, diagnosis or therapy or features, which support the clinicians in decision making and contribute in the automation of clinical workflows. Another important characteristic is that they are designed to be shared [65].
Besides EHRs there are two types of health records, namely Electronic Medical Record (EMR) and Personal Health Record (PHR), which are sometimes erroneously used interchangeably with EHRs [35]. The main difference between these types of records consists in the ownership of the data and the benefits they offer. EHRs are collected and shared between one or more healthcare providers and owned from the organisation, which has created the document, while EMRs are "the digital version of a chart" and are collected from clinicians. Unlike EHRs they are not designed to be shared across organisations [65]. On the other side, PHRs are managed by the patients or the patient's legal proxy in contrast to EMRs and EHRs. So, the patient can manage relevant health information herself/himself. PHRs can be 'Integrated', 'Standalone', and 'Tethered' [35].
It is increasingly acknowledged that if used and designed properly the EHRs provide

multiple benefits, such as easy reading, quickly and timely access of information from all over the world, increased collaboration and coordination, improved efficiency and patient outcomes, reduced costs and emergency evacuation times, improved information about the patients or prevented delays, just to name a few [24, 49, 35, 36].
In order to enable exchange of data it is important to achieve standardization. In healthcare the usage of structured data is particularly beneficial, because it firstly ensures a seamless integration and exchange of data among different healthcare providers [66, 41]. Secondly, it supports population health and secondary use of medical reports in the research field, as it allows a simple processing and analysis for machine learning algorithms. Thus, an increased focus on standardization should be achieved [66, 41].
In the field of health informatics multiple international standards have been developed, in order to ensure the interoperability between the healthcare providers and between providers and their patients. ISO/TC 215 is an organisation, which deals with standards for data exchange in healthcare [67]. There are standards used for the terminology (Logical Observation Identifiers Names and Codes (LOINC), SNOMED-CT, International Statistical Classification of Diseases and Related Health Problems (ICD), etc.), for the eHealth architectures, or messaging and document exchange (HL7, FHIR, CDA) [35]. Some of these standards were explained in Subsection 2.2.3.
However, structured data are considered to be less flexible compared to unstructured data in a human computer interaction perspective, as it only allows limited options [68, 69]. The healthcare domain is information-intensive and produces lots of unstructured data, such as medical videos, biosignal or audio data. Doug Fridsma, head of government partnerships said in an interview: "Healthcare is about the human condition and the human condition is a story, an unstructured narrative" [70]. Another challenge of using structure data are the cultural barriers for using standards [69].
Notably, EHRs per se demonstrate some considerable shortcomings, if not designed properly and may have some barriers.
Firstly, healthcare professionals may consider the computer as "a third person", which decreases the time spent face-to-face with their patients by considering the electronic documentation as a work of low satisfaction and high time-consumption [64].
Arndt et al. [42] found out that GPs spend half of their day work using EHRs. Another study conducted in a teaching hospital in New York also indicated that residents spend 50% of their shift time with computer interaction and only 10% with direct patient contact [43].
Moreover, EHRs can threaten patient safety because of medication errors, unsecured networks (cyber attacks, data manipulation, computer malware), incompatibility of systems, lost orders or other usability issues [44, 45]. Data protection and security of systems are challenging issues as well. Furthermore, the clinicians' resistance towards the usage of EHRs remains a barrier in the adoption of such services [49].
Melby et al. [32] conducted interviews with 17 Norwegian GPs before the implementation of the cross-institutional EPIC-based EHR in Norway about their expectations of such a system, where six main themes where outlined. Firstly, the GPs expressed the need for shared information with a common medication list. Secondly, they feared that such

a system may cause information overload, so it would be difficult to find the relevant information or that potential ethical challenges may be added with the increased access of information. So, the GPs argued for the need for shortly summarized information, such as discharged letters which includes the essential information of the patient. Moreover, the GPs expressed the need for the digital dialogue with their collaborating partners in case they do not know how to interpret the information in the EHR. Another concern the GPs expressed was the different meaning of the EHR, which could result in changing their working style reflected in the documentation, in order to be understandable for their colleagues in hospitals. Privacy was the last theme of the study, where the GPs addressed the issue of sharing more than the essential information with the other facilities, such as hospital or home care staff. The authors included that the GPs in their study where ambivalent about the deployment of the cross-institutional EHR in Norway. They considered the potential of such a system, but on the other hand they saw several issues that may occur with the new system, which the authors interpreted as a form of resistance towards the new cross-intitutional EHR in Norway.

This section discussed eHealthRecords and distinguished them from other types of health records, including PHRs and EMRs. To comprehend the words in the context of this study, the distinction of these types is crucial. Additionally, this section demonstrated how frequently electronic health records are used in clinical settings and how much time healthcare professionals spend on the online documentation. The advantages of electronic health records are numerous, as was already mentioned. In order to ensure patient safety, it is crucial that they are correctly designed.

2.3.2 Electronic Referrals (eReferrals)

Referrals are defined as the direction of patients from referral provider to another provider in more specialised care level "by transferring (including sharing) all or some of the responsibility which fall outside of a physician's competence" for better treatment results [71]. The communication mostly occurs between healthcare providers in primary and specialty care settings by serving as a link or interface between these care levels [72]. Referrals offer timely access to more specialised care, which is associated with improvement in health outcomes and cost reduction for the healthcare system and the patients [72]. An effective referral system "ensures that there is a close relationship among all levels of health care and patients can receive the best possible care" [73].
However, studies estimate that 25% - 50% of the referrals do not comprise complete information, including the reason for the referral [72]. This is a problem, which can be solved by using digital referrals.
In recent years, electronic referrals have been implemented in multiple countries for replacing the manual process of paper-based or fax based referrals. eReferrals support the automation of the referral process by standardising the information and communication [71, 74].
Among the countries with eReferrals adoption are UK, Norway, Finland, Denmark, Netherlands, Canada, U.S., Australia, and New Zealand [72].

In New Zealand the health information goal of eReferrals CareConnect is “referring patients to the right practitioner with the right information and receiving the right response", in order to serve logistics of information and knowledge in healthcare [71].
In UK the referral system was started in 2015 and is called the NHS e-Referral Service. The service includes eAppointments, so the patients can book an appointment online in outpatient settings and manage their referrals by choosing themselves where, when and how to get the care service [72]. eAppointment is also known as Electronic Appointment Scheduling or eBooking. In order to manage the referral online, the patients need to type in the booking reference number, the year of birth and the access code. Thereby, the patients have the option to check for appointment details, change the appointment, as well as cancel the appointment or referral. [75] In addition, the NHS referral service includes open data dashboard, which displays statistics about the number of referrals, appointment slots and bookings per week [76].
The implementation of national or cross-border eReferral systems offer multiple benefits for different stakeholders in care. Firstly, they can contribute to better patient outcomes by increasing effectiveness of clinical communication and improving the relationship between primary and more specialized care levels [74, 72]. Secondly, eReferrals can contribute to patient satisfaction by reducing the waiting times or unnecessary follow-ups and by improving patient participation in online appointments [72]. In addition, computerized referrals can optimize patient flow and improve workflow efficiency by enabling information transfer in a timely and structured manner [77, 71]. Thus, digital referrals can enhance the quality of referrals by increasing completeness and helping physicians in more specialised care to better identify the reason (clinical question) for referral [77, 74]. In addition, eReferrals provide the opportunity to triage and clarify the reason of referring, which may contribute to better previsit guidance among medical specialists [72]. Moreover, the quantity of the referrals is estimated to increase after the adoption of electronic referrals [74]. Doumouras et al. [78] conducted the outcomes of referral rates of bariatric (weight-loss) surgery after the implementation of the electronic referral system in Ontario, Canada in 2015 in a single-payer healthcare system. The authors analysed the data with the logistic regression model, which indicated a significant increased total number of referrals in bariatric surgeries after the usage of digital referrals compared to paper-based referral process. Furthermore, this study identified factors associated with higher eReferral rates, including being a female General Practitioner in the first 5 years and closer to bariatric centers.
On the other hand, Chambers et al. [79] used segmented regression analysis to explore the rates of referrals related to the usage of eReferrals in the Bronx, New York. They stated significant increases of referral numbers after implementing eReferrals. However, only when combined with provider education intervention. Implementing the eReferrals alone did not show significant increase of referral numbers.
Nonetheless, Azanor-Alonso et al. [74] stated in a systematic search, that the evidence related to cost-effectiveness and clinical benefits of eReferral systems is positive, but limited. The authors identified variations in results and lack of standardised design of studies, so the advantages of electronic referrals can not be generalized across different

settings. Furthermore, they could not determine the cost-effectiveness of eReferrals, as only one study was related to economic benefits.
Multiple studies conducted the variety of factors influencing the success implementation of eReferrals.
Hysong et al. [80], Naseriasl et al. [72] and Seyed et al. [73] addressed factors affecting the successful adoption of referral systems by conducting scoping reviews. Hysong et al. arose the need to create clear policies for standardization of tasks and roles across subspecialties and detailed instructions on eReferrals. The main barriers they identified were not technological but rather communication and coordination issues, such as who needed to do what or communicate to whom, so role clarity was another important factor affecting the successful implementation of eReferrals [80].
Naseriasl et al. [72] emphasised the need of political support and attention to sociotechnical conditions for a successful eReferral implementation.
Further, they indicated that in Finland the success was based in careful planning and adequate implementation, while in Denmark key factors for a successful adoption of eReferrals as part of the Medcom project included "political support, consensus on national standards, cross-sector and cross-professional agreements" [72].
New Zealand's successful factors consisted in "leadership and change management, obligation towards superior authorities, and similar to Denmark, the involvement of multidisciplinary groups in implementation, testing and evaluation of the system" [72].
Seyed et al. [73] classified the factors contributing to effective and efficient referral systems based on their literature review in 4 main themes, including technology, processes, organization, and individuals. The authors further identified fourteen subthemes.
The technology factors included firstly the implementation of eReferral for the benefits it offers. Secondly the coordination between healthcare levels. Thirdly responsiveness can reduce delayes in treatments and improve patient participation and finally proper feedback, which increases the quality of eReferrals.
The second main theme "processes" consisted of effectiveness and efficiency. The effectiveness is ensured if the GPs are continuously trained, referral policies are implemented and standard guidelines and structural forms are created. The efficiency is ensured if a.o. the management skills are improved, measurements for attracting specialists.
The organization included similar to the study by Naseriasl et al. management, policy making, planning, rules and regulations and patient-centered communication.
Finally, insurance coverage, awareness, attitude and social influence are among the individual factors that result in successful referral system.

To conclude this section, the use of electronic referrals offers numerous advantages for various healthcare stakeholders and patients, such as a decrease in waiting times or an increase in referral completeness [77, 74, 72]. Political backing and the participation of multidisciplinary groups in the system's implementation, testing, and assessment are required for the successful implementation of electronic referrals [72].

2.3.3 Electronic Prescriptions (ePrescriptions)

Electronic Prescriptions (eRx) are accurate digital prescribings transmitted electronically among healthcare providers, which commonly consist of prescription orders sent from the prescriber (point-of-care) directly to the dispenser (e.g. pharmacy system) [81]. In addition, eRx provides access to the patient's medication list and given medicine from the dispenser in online patient portals and authorized practitioners. Electronic prescribings can be illustrated by the following three-steps model [82]:

- **Step 1: ePrescribing** - The digital prescription is generated by the prescriber in the point-of-care [82].
- **Step 2: Electronic transfer of prescription** - "The prescription is transmitted electronically to the pharmacy (dispenser)" [82].
- **Step 3: eDispensing** - "The dispenser access the prescription and can optionally report on the medicine given to the patient" [82].

Electronic prescribings are also called Computerized Physician Order Entry (CPOE) for medication orders, a process describing the entering and transmitting of orders, which consist of treatment instructions [83]. The digital prescribing service is a high frequent service, mostly used in outpatient settings and involves different stakeholders in healthcare [84]. Because of its independence towards other eHealth services, it can be implemented even in paper-based environments, if basic technical infrastructures (such as access to internet or the ability of healthcare providers to sign digitally) exist [85].
In the last two decades eRx was progressively being adopted in many states, particularly in the Scandinavian countries, which are considered as pioneers of eHealth services [82]. The world's first computerized prescribing was sent in 1983 in Sweden [82]. In Denmark and Sweden digital prescribings were launched back in the 1990s. In 1994 Denmark laid important foundations by establishing the central eHealth organisation "Medcom", which aimed to define standards and to establish the technical infrastructure for a secure transmission of eRx by involving different healthcare actors. Previously, Denmark and Sweden used the message-broker system "EDIFACT Med 3 standard" for the electronic transmission of prescriptions to a secure mailbox.
In 2001 the EDI-standard in Sweden was replaced by the European XML format "ENV 13607". In the 2010s both countries achieved high rates of prescriptions sent digitally, approximately 100%. [82]
In Denmark and Estonia the mailbox was later replaced by a shared medication record, where the prescriptions were stored in an integrated data repository by offering new opportunities in healthcare [37]. Over time, the features of electronic prescribings became more sophisticated and included tools for providing drug cost data and suggestions of the preferred formulations, an integrated clinical decision-making for alerting in cases of interaction between medications or between allergy and drugs, medication lists in patient portals, to name a few. In some countries, including Denmark, Estonia, and Netherlands

the eRx service is meanwhile mandatory to use for the healthcare actors involved in the medication process.
In the recent years the potential of adopting computerized prescriptions has already been recognized by multiple countries, so the acquisition and adoption of digital prescribings are desirable goals on the agendas of the governmental policymakers [37].
Some countries with a nationwide eRx adoption, include Belgium, UK, the Netherlands, Spain, Scottland, Australia, Canada, and USA [82].
Furthermore, incentives beyond the national borders of the EU states have been undertaken in the epSOS project (2008 - 2013), which was followed by the eHDSI program as of 2014. eHDSI is an infrastructure created to enable cross-border exchange of electronic prescribings and patient summaries beyond the European state members, which goals are to create a single digital market and achieve higher patient mobility across the EU state members. eRx adoption has been a crucial part of the European cross-border healthcare vision [82] [37].
In 2019 Finland and Estonia were the first countries in the EU to use ePrescription across borders via eHDSI, by enabling Finnish patients to retrieve the medication in as Estonia pharmacy, ordered by their physician in Finland electronically or Estonia patients in Finland's pharmacies [86].
Multiple studies have shown the significant benefits that digital prescribings offer for the prescribers, dispensers and patients, including health, economic, and social benefits. On the other hand, the traditional hand-written prescriptions are considered to cause a high rate of medication errors by threatening the patient safety because of illegibility and incompleteness [82, 37, 85].
Notably, electronic prescribings have the potential to address these issues [84, 85, 87].
Beyond the reduced printing costs [37], eRx enhances patient outcomes by speeding up the access to patient medication and reducing medication errors. In an outpatient setting in the US the error rates were reduced from 42,5% to 6,6% one year after the implementation of the ePrescribing system [87], while in Sweden an error reduction by 15% was noticed after using digital prescribings [82].
Moreover, digital prescriptions have the potential to improve patient adherence by eliminating the loss of prescription [85]. They can reduce abusing or fraud, which is particularly beneficial in prescriptions of controlled substances and enhance patients' and practitioners' convenience, especially in case of repeated prescriptions. Digital prescribings enable more transparency by leveraging the accountability among prescribers and dispensers [85, 82, 37].
In addition, they raise awareness of the co-payment system among physicians by providing drug cost data and suggestions of the preferred formulations, which support professionals in decision-making for medication treatments and contribute to reduction of medication cost for the patients [85, 83].
Thus, electronic prescribings improve efficiency and lower costs in healthcare and the workload for staff among prescribers and dispensers [37, 84, 85].
In Sweden digital prescribings were estimated to save the physicians around 30 minutes daily [37].

Ross et al. [83] indicated that the increased accuracy and completeness of data when using ePrescribing reduced 53% of the call-backs from the pharmacy and 62% of the calls to the pharmacy [85, 83, 37]. In this case the workflow does not get interrupted and contributes to improved efficiency in healthcare [84, 85].
In Sweden 98% of the pharmacists are satisfied with the ePrescribing service, mainly related to increased efficiency [37]. The reduced waiting time in the pharmacy may contribute to higher patients' satisfaction as well [85, 83].
However, the time savings when using eRx is dependant on the healthcare provider's practice manners and can in some cases reduce the efficiency for single prescriptions [37].
Beyond the lowering of costs, the reduced time spent with calls or requests from the pharmacy is associated with lower administrative burden of the clinical staff [83, 84].
Furthermore, ePrescribings often contain tools able to support in the clinical decision-making. Such tools provide alerting features in cases of interactions between medications or between drugs and allergies, duplicate medications, contra-interactions, and formulary substitutions [85, 83].
However, earlier studies have emphasised the need for minimizing the frequency of alerts and optimize them by only showing true positive alerts, considering that the notifications can otherwise cause an alert fatigue in clinical decision-making and easily be overridden among physicians [88, 89].
Thomas et al. [85] noticed that 58.8% of the providers responded to drug interaction alerts only once or less per week, which in cases of inappropriate overriding could threaten patients' safety. Some years later, Nanji et al. [89] found out that 40% of overrides in medication-related clinical decision-making alerts were not justified and suggested to tier the alerts with hard-stops requiring user action for the most severe alerts, in order to draw their attention to the alerts [89]. However, the hard-stops could interrupt the workflow and delay the treatment [89].
According to Sijs et al. reasons for overriding medication-related alerts may be the physician's faith in their own knowledge, workflow interruptions, unclear information or lack of time [88].
Other possible hazards of digital prescribings are the overdependence on technology (downtown or poor functioning of the technical infrastructure may lead to problems), poor usability UX design, or environmental factors, which may lead to medication errors [90, 85]. Moreover, the implementation of ePrescribings across borders may pose some challenges in terms of legislation and approaches.
In case of achieving prescriptions exchange across border in the European Union it was noticed that different states had different prerequisites, country sizes, service maturity levels, health system models, different data protection laws or privacy enforcement, so they needed different implementation approaches [37].
On the other hand, it is important to not only implement the eRx system, but also use it in a "meaningful" way [91]. Studies indicate that in some cases users do not routinely use the extended features, such as obtain information of patient formulary [85, 91]. Some challenges while adopting eRx in outpatient settings may occur because of "poor functioning of the technical infrastructures", "lack of technical support", "unrealistic

expectations among users", "increased costs" and "lack of time to learn about new systems" [92, 91].
Crosson et al. [91] conducted a qualitative case study by involving 5 outpatient primary care practices, in order to identify determinants, which lead to successful adoption of eRx. Some of the factors for achieving meaningful use mainly consisted in the careful planning, practice transformation efforts, a clear ePrescribing strategy, appropriate standards for health information exchange, available IT support particularly throughout the implementation process and in general appropriate level of support, including the technician's readiness to visit practices for training or troubleshooting [91, 82].
An earlier study estimated hat the healthcare providers who already used ePrescribing were more positive for adopting the electronic prescribing of controlled substances than those not using it [85].
Moreover, the type of the national health system is another factor that influences the successful adoption of eRx. According to these studies countries with centralised health systems achieve higher rates of adoption than countries with more decentralized healthcare models [82].
Another factor contributing to successful adoption is the coordinated rollout with an effective pilot phase [82]. England phased the adoption of ePrescribing in primary case into two releases: R1 (2005) and R2 (2018), by involving stakeholder's feedback, allowing users to become accustomed to using eRx and gaining time between the two releases to resolve the challenges, which were detected during the implementation [82, 37].

To conclude, electronic prescribings promise significant potential for enhancing the overall healthcare quality in a country. Thus, launching this service is often a crucial step towards the implementation of national eHealth and an initial component in governmental eHealth strategies [82]. Higher technology familiarity levels may contribute to more successful adoptions of eRx [85].
Nevertheless, the aforementioned factors are critical to successful adoption of electronic prescribings. Also the technical implementation must consider "the national guidelines and regulations for information governance framework" [82].

2.4 Innovation barriers in healthcare

The analysis of the literature contains multiple instances of 'failed' EHR implementations in the healthcare industry [93]. Thus, it is important to understand and pre-analyse innovation barriers in healthcare. By concentrating on the difficulties experienced when adopting innovations in healthcare, this section serves as an introduction to frequent innovation barriers. This literature review is necessary to comprehend the obstacles to innovation in the Albanian context, which will be discussed in subsequent chapters.

2.4.1 General innovation barriers

The implementation of innovations may face multiple barriers. The employee resistance counts to one of the most important barriers, which can be caused by different determinants. Multiple studies have found that innovation and changes in the organisational process even in modern organisations may "provoke resistance" [94], or "harbor conflict" potential [95]. According to Zwick [96] "resistance can be created if the preferences of the company are incompatible with those of the employees, i.e. employees cannot achieve their personal goals by serving the company's goals".
Zwick showed that "employee resistance is stronger if the innovation is aimed at decreasing employment or increasing the workload of the employees and if the business prospects of the firm are negative" [96]. Other determinants for stronger employee resistance include the absence of innovation information, poor working environment, acquiring very specific skills, or when it is uncertain that the costs of training efforts will be offset by compensation because of a risk of losing the job [96]. Larger companies may also experience increased levels of resistance, as the communication channels between management and employees are more indirect and formal [96]. Moreover, the sector of the company may play a role in the level of resistance. IT companies are known to be more innovation friendly than other sectors [96]. Thus, it is important to consider general barriers before implementation, in order to achieve higher acceptance for the innovation. Zwick, 2003 suggests that the framework conditions which influence the resistance towards innovation can be pre-analyzed, in order to prevent resistance [96].

2.4.2 Innovation barriers in healthcare

Innovation in healthcare technology, similar to innovation in other disciplines may face barriers of individual, technical, environmental and organisational nature.
Firstly, the individual barriers include trust-related barriers, cognitive issues (poor digital/eHealth literacy, education), lack of motivation (unclear benefits of the new technology), or added workload [97, 98].
Secondly, the implementation of the innovation may face environmental and organisational barriers. These barriers include financial issues for eHealth services, political barriers (proof of effectiveness and efficiency of eHealth), organizational structures (missing fit into organizational structures), and lack of necessary devices [97].
Thirdly, there may be technical barriers, including unsuited services, which do not fit

the user's needs [97, 98], privacy and security concerns, confidentiality [97, 98], system language [97], missing support (not knowing who to call for help) [97], missing standards for data exchange and lack of harmonization of the eHealth services [97, 98], or missing system feedback [97], to name a few. Moreover, Ruiz et al. [99] found out, that physicians with previous experience in the healthcare technology tend to be more open to its implementation.
Technology adoption is the process of introducing new technologies and that encourages the users to use these technologies [100].
There are some technology adoption models that try to describe theories why people use the technology and what predictive factors influences the successful adoption of a new technology [101, 102].
The eHealth technology have the potential to achieve higher adoption, if the benefits of the new technology are transferred to the user, the providers are familiar with technology, the physicians perspectives and their needs are considered, ease of use and implementation [97], and the trialability or the ability to test without risk is ensured [85].
Other facilitators for technology acceptance include availability of resources [97], integration into care [97], communication improvement [97], "support of the usage of eHealth services by on-site experts" [98], "tailoring to the individual physician's knowledge of eHealth" [98], "follow-up sessions for physicians" [98], motivation [97], involvement of all relevant stakeholders [97], and user-friendliness of the system [97].

To finish this subsection, it should be noted that employee resistance is one of the most significant barriers to new technology [96]. Additionally, the level of employee resistance may vary depending on the size of the company. Due to the formal and indirect methods of communication between management and staff, larger firms might experience higher levels of resistance. Moreover, obstacles could include monetary and personal concerns [97]. Therefore, it's crucial to do a preliminary analysis of the potential barriers when introducing a new technology [96].

2.5 Summary

This chapter mainly presented some common eHealth solutions being used in international nations, their benefits, issues, and challenges. Moreover,it demonstrated how crucial it is to implement some regulations and take certain recommendations into account in order to achieve a successful adoption of eHealth solutions and increased user acceptance. We also discussed general and particular innovation constraints in the healthcare sector. Some technical aspects and tools dealing with interoperability, the analysis of large data and security-related technical issues were presented. we also stated the European Union's efforts to facilitate cross-border exchange of eHealth services across European Member States, as well as the challenges that developing countries would additionally experience. The next chapter will describe the methodological approach we used in this thesis in detail.

CHAPTER 3

Methodological Approach

In order to explore the topic of this thesis qualitative research with a multi-faceted approach was used.

- **Firstly**, literature research was crucial, especially in the initial phase of research.
- **Secondly**, a comparative review was conducted, in order to gain knowledge about implemented eHealth services in other countries, their challenges, or best practices in this field. The selected countries for the review are small countries, of similar size as Albania, located in Europe and members of WHO. Their practices contribute to a better understanding of the status quo of Albania and further comparisons, which will be discussed in later chapters.
- **Thirdly**, interviews were conducted with 25 diverse stakeholders in different sectors and cities in Albania. The interviews were evaluated with the Reflexive Thematic Analysis (RTA) approach via MAXQDA software. For all the interviews, ethical issues and General Data Protection Regulation (GDPR)s, described in Subsection 3.3.2 were considered and complied with.

The methodological approaches are further described in the following three sections.

3.1 Literature Review

As previously mentioned, initial search for relevant literature was essential, in order to get a general overview of the thematic in focus. Thus, a comprehensive primary and secondary scientific research were conducted on literature reporting on digital health in general and the eHealth services, by focusing on their chances, challenges, threats and strengths. Some databases for literature search included PubMed MEDLINE,

ScienceDirect, Cochrane, Digital Bibliography & Library Project or GoogleScholar. In order to search for relevant literature different keywords and MeSH terms were used. In addition, the author searched for related global reports published from the WHO. Some keywords included *Electronic Health Record, developing countries, middle-income countries, Albania, Digital Health, healthcare, health ICT, hospital information system, digital chart, electronic referrals, electronic prescribings, computerized physician order entry, telemedicine, electronic appointment scheduling, electronic immunization registries, standardization, interoperability, telemedicine, technology adoption.*
In addition, non-academic literature and grey literature search was conducted, including sources such as the official website of Ministry of Health in Albania [103], government documents, newspaper articles, online recordings or podcasts, particularly those related to healthcare digitalization and eHealth policies in Albania, which helped to get an overall understanding of the topic in focus.
Finally, additional related articles were identified through the the reference lists of the initial related works. The literature materials were managed by Mendeley Ltd. web-interface, a reference management software [104].

3.2 Comparative Review

A review of used eHealth solutions in other European countries of similar population size as Albania was conducted, in order to gain knowledge about adopted eHealth solutions, the issues they experienced or the lessons learned. The countries will include Denmark, Estonia, North Macedonia, and Slovenia. The services, experiences, or issues will then be compared to the services adopted in Albania.

3.3 Interviews

After the initial search, interviews with 25 domestic healthcare stakeholders were conducted, either on-site or online. Thus, this thesis provides first-hand information and shows an insight into what is offered, what is used and what should be improved on the health digitalization landscape in Albania.
The physicians willing to participate were mainly recruited online via email, while participants from other professional groups were recruited on-site in health centers or hospitals by going there and asking whether they were willing to participate in this study.
The interviews lasted 15-60 minutes. Broad topic themes included the computer environment in their healthcare institutions, the eHealth solutions they use, the benefits of the existing digital solutions, difficulties, possibilities, as well as reflections on what should be improved in the Albanian digital health landscape.
Twenty interviews were conducted due to site visits in the healthcare institutions and five were held online, as verbal e-interviews. Am interview guide divided in sections (See Appendix 8.2) was prepared and used for the interviews.
The online interviews were useful in this study, in order to reach more participants, due to geographical dispersion and convenience of the participants, who had limited time

during the working hours. The e-interviews allowed more flexibility, as they can be held anywhere at any time. They were organized considering the eight key questions in the e-interview research framework, which included guidelines of how a virtual interview can be held [105].
For the e-interviews synchronously web conference meeting spaces were used, which allowed visual interactions, but also the exchange of documents, which insured credible research participants. Ethical issues, described in Subsection 3.3.2 were considered.
All the interviews were held in Albanian (mother tongue of the participants) and were audio-recorded, if the participants consented. Otherwise, notes were taken.

3.3.1 Participant Characteristics

The participants consisted of 25 domestic healthcare stakeholders active in diverse health professionals from all healthcare levels, respectively in Health Centers, Regional Hospitals, and University Hospital mainly in the governmental sector. Three interviews were conducted in three different private hospitals. The participants included clinicians (mainly physicians, but also some nurses), hospital admission, hospital IT, some pharmacists from pharmacies with agreements with Albanian Compulsory Health Insurance Fund (FSDKSH). In addition, one leading governmental expert of the Health Ministry in Albania was involved. For all the interviews demographic data, such as Age, Gender, Experience in Years, Institution, Specialty, and Profession was collected. The participants were active in four different cities in Albania, including the capital city Tirana. Participants had a mean age of 44,88 and 52% were male, 48% were female. Some demographic information about the participants is shown in table 3.1. The final column indicates whether the interview was conducted on-site or remotely.

3.3.2 Ethical issues and GDPRs

In this thesis the following ethical issues and GDPR were considered and the participation in the interviews was voluntary.

Data collection

Personal data processing was done in accordance with article 13 of GDPR [106], in order to handle them correctly. The name of the participants was pseudonymized with a Participant-ID. All the evaluations and presentations of results that is published or passed on to third parties were carried out in pseudonymized form. So any information from the participants had a number on it instead of his/her name. Only the researcher knows what the number is.
Moreover, data about the ethnicity or religion was not processed. Only the following demographic data was collected: Age, Gender, Experience in Years, Institution, Specialty, and Profession.
The demographic data was safely stored in a separate list and some of them, such as the age, experience, and gender were not included in the thesis, as they could be linked to a

ID	Profession	Institution	Interview
01	Physician	University Hospital	Remote Interview
02	Nurse	Regional Hospital	On-site Interview
03	Nurse	Regional Hospital	On-site Interview
04	Physician	Private Hospital	Remote Interview
05	Physician	University Hospital	On-site Interview
06	Physician	Private Hospital	On-site Interview
07	Physician	University Hospital	Remote Interview
08	Hospital Admission	Regional Hospital	On-site Interview
09	Hospital Admission	Regional Hospital	On-site Interview
10	IT Technician	Regional Hospital	On-site Interview
11	Physician	Regional Hospital	On-site Interview
12	IT Technician	Regional Hospital	On-site Interview
13	Physician	Regional Hospital	On-site Interview
14	Nurse	University Hospital	On-site Interview
15	Director of Healthcare Progress & Quality	Ministry of Health	Remote Interview
16	General Practitioner	Primary Healthcare Center	On-site Interview
17	General Practitioner	Primary Healthcare Center	On-site Interview
18	IT Technician	Regional Hospital	On-site Interview
19	Pharmacist	Private Business	On-site Interview
20	Pharmacist	Private Business	On-site Interview
21	Pharmacist	Private Business	On-site Interview
22	Pharmacist	Private Business	On-site Interview
23	Physician	University Hospital	Remote Interview
24	Physician	Private Hospital	On-site Interview
25	General Practitioner	Primary Healthcare Center	On-site Interview

Table 3.1: Demographic Characteristics of the Participants & Interview

specific individual. For example, in cases only one physician or IT-employee works in a specific profession or specialty in a particular hospital. So, the demographic data only served for statistical purposes, such as illustrating the average, min, or max age of the participants, the gender relations, average, or min or max experience in years. Moreover, it allows us to better understand some background characteristics of the digitalization in Albania, for example whether specific sectors or specific specialties have more access to digitalization than others, and so on.
The only recipients where all the demographic data could be transmitted if necessary was the advisor of this thesis, Prof. Geraldine Fitzpatrick or the back-up supervisor.
Furthermore, during the interviews no patient data was collected directly or indirectly.

Data processing

As mentioned before in text, the interviews were audio-recorded, only if the participant agreed. The interviews were then manually transcribed for further evaluation, while text passages, which could lead to the identification of the participation, were either pseudonymised or completely removed from text. Personal contact data and demographic data were stored separately in another list.
The data will be stored for as long as required by legal retention periods or as required by the purpose.

Information and Consent

Each participant received an informed consent documentation in Albanian (included in Appendix B 8.2 and Appendix C 8.2), which included the relevant ethical considerations, such as how the purpose of the study, the methodology, the main topics of the interview, description on how personal data was processed and other legal commitments based on the Technical University good practice recommendations [107]. In addition, the document included the section "Certificate of Consent", where the participants could agree with their sign to participate in this study, in cases the circumstances and time allowed it.

3.3.3 The analysis process of the qualitative dataset

After conducting the interviews a large amount of data was collected, which had to be translated and analysed. The interviews were transcribed manually, translated to English and finally analyzed by using the guidelines of the RTA approach, in order to get through the interview data in a systematic manner [108]. The RTA is a theoretically flexible and a common method for analysing qualitative data. It is an iterative process, which aims to identify patterns of meanings in an organised manner, based on the themes defined by the researcher and is characterized by the three attributes "creative, reflexive and subjective" [108]. Braun and Clarke [109] define RTA as a "method for developing, analysing, and interpreting patterns across a qualitative dataset, which involves systematic process of data coding to develop themes". In order to analyse the data set the following six phases were applied, as described by Kiger & Varpio [110]:

- Phase 1: "Familiarizing with the dataset" [110]
- Phase 2: "Generating Initial Codes" [110]
- Phase 3: "Searching for Themes" [110]
- Phase 4: "Reviewing Themes" [110]
- Phase 5: "Defining and Naming Themes" [110]
- Phase 6: "Producing the Report" [110]

The first phase consisted of transcribing, as the data consisted of audio files. After transcribing the interviews, we started to familiarize with the data by reviewing the transcripts of the interviews and translating them from Albanian to English. The second phase involved creating a set of preliminary codes in the data, which represent the interesting information from the interviews and searching the data for instances of these codes. In some cases it was necessary to combine the codes, as they were expressing the same concepts. Using the codes that were often encountered, phase three included creating general themes, which represent broader ideas than the codes. Phase four and five consisted of reviewing the themes we generated by identifying and creating coherent and distinctive themes, based on the research questions we identified in this thesis. For instance, we created groups for the benefits and for the issues of the eHealth solutions and categorized the themes in the suitable category. The final phase consisted on producing the report based on the themes and illustrating them with quotes from the interviews.
For the execution of these phases, the qualitative data analysis tool "MAXQDA" [111] was used due to the big size of the dataset generated from the interviews. It was useful to use MAXQDA, as it facilitated the analysis of the interviews with the features it offers.

3.4 Summary

This chapter describes the methodological approach we used, in order to produce the results of this study. The approach mainly consisted of literature research, comparative review, and the interviews conducted with the domestic stakeholders in Albanian health-care facilities. The ethical issues and GDPRs described in this chapter were considered and the participation in the interviews was voluntary. The participants received an informed consent documentation, where they could agree to participate in the study. The analysis process of he qualitative dataset was done by conducting the RTA approach in the qualitative data analysis tool MAXQDA.
The next chapter will provide the comparative review of the four nations we evaluated.

CHAPTER 4

Comparative Review

This chapter provides a comparative review of the eHealth services of four small European countries, including Denmark, Estonia, North Macedonia, and Slovenia. It describes the eHealth solutions, as well as innovations or successful tools being used in the healthcare scene of these countries. This review aims to contribute to the knowledge building of eHealth solutions and best practices from other countries in order to compare them to the Albanian approach to eHealth. Criteria for country selection include the number of citizens > 1 & < 6 million, country being located in Europe, and being a member of WHO. The research questions per country consisted of which eHealth solutions are being used, what are their issues, and what are the lessons learned in relation to eHealth.

4.1 eHealth in Denmark

Denmark is located in northern Europe and has a population of 5,935,619 (2023) [112]. The development of EHR has a long history in Denmark, dating back to the year 1996, where the development of such systems in hospitals was pushed with the first national strategy [113]. Nowadays, the country is one of the pioneers in eHealth. The implementation and coordination of large-scale IT projects in the healthcare sector in Denmark are done by MedCom. MedCom was established in 1994 and is a non-profit organisation, publicly funded and owned by the Danish Ministry of Health and Local Government [114]. In 2008, Denmark was ranked 2nd in the Euro Health Consumer Index for implementing the eHealth sub-disciplines [12].

4.1.1 eHealth solutions

In Denmark, the following eHealth solutions are used: ePrescribing, eReferral, eHealthRecords, Patient Administration System, Patient Portal, and Laboratory Information System [113, 115].

MedCom stated in 2005 that "100% of pharmacies use IT and communicates electronically with general practitioners and hospitals", "100% of hospitals have Patient Administration System, Laboratory Information System, and other proprietary systems", and "95% of general practitioners have an electronic health record [113].
Sundhed.dk, the Danish eHealth Portal, was launched in 2003 and provides access to Danish healthcare services [116]. The portal contains information about domestic healthcare services and makes it possible for citizens and health experts to collaborate based on the same data by providing services to both groups. Each citizen has a personal page that is available only after proper identification and describes their particular situation. Individuals can obtain up-to-date, accurate health information here. They can access the diagnoses and treatments, schedule general practitioner appointments, access community illness management systems at outpatient clinics, register as an organ donor, or modify a prescription. Additionally, medical practitioners can log in and gain secure, regulated access to patient personal information from patients they are actively treating. Since general practitioners are the gatekeepers of the Danish healthcare system, sundhed.dk has until now concentrated particularly on tools for them [116].
In 2016, Denmark started the nationwide implementation of EPIC, which is a US-developed EHR, aiming to increase information access for healthcare professionals, improve communication, and reduce data fragmentation by implementing tailored views for shared databases for different clinicians [117]. The EPIC interface offers the providers the patient administration module, billing system, and systems for clinicians, pharmacists, labs, and radiologists [117]. In Denmark, the system is only available for hospitals, but it entails an interface that allows for sharing information with facilities in primary care and home care services [117]. Nevertheless, some studies noticed that the implementation of EPIC still remains discontented even after many years of deployment in Denmark and is associated more with challenges than solutions [117] [118]. Hertzum et al. [117] found out that 32% of the users "remain dissatisfied or very dissatisfied with the system" for various reasons, including the increased time required to perform clinical tasks and the slow correction of usability issues [117]. Moreover, the complexity of the systems regarding the sociotechnical aspect was increased with the addition of functionalities [117].

4.1.2 Lessons learned

Hostgard et al. [119] analysed the outcome of the EHR development process in the North Region of Denmark by using the constructive eHealth evaluation method, which offers a "full-lifecycle evaluation framework". The study found that the involvement of the end-user from the earliest possible stage is a crucial organisational method in eHealth developments to achieve a successful outcome. Concretely, in the study, the clinicians took ownership of the decisions and showed higher recognition of the clinical benefits when involved in the design and implementation of new eHealth solutions. Other important factors were selecting the best possible representation of all clinician groups and reducing the workload. The authors concluded that the constructive eHealth evaluation method supports and facilitates the involvement of end-users in all project phases by improving

the adoption of eHealth.
In addition, the Danish eHealth portal sundhed.dk is a successful tool in Denmark. The portal director, Peterson, stated in an interview that "it's important to emphasise the advantages of digitised and available data for patients and medical staff to achieve acceptance of the portal" [120].

4.2 eHealth in Estonia

Estonia is a country located in northern Europe and has a population estimated at 1,329,064 in 2023 [121]. The country has some successful stories regarding the technological progress in governmental services for the citizens, including the development of eHealth solutions, which have been nationally implemented since 2008 with the goal of offering high-quality healthcare services for the patients [122]. In 2018 Estonia was ranked 15th in the Euro Health Consumer Index [12].

4.2.1 eHealth solutions

The national eHealth project is called the Estonian nationwide Health Information System and was launched in 2008 by the Ministry of Social Affairs [122]. The project was funded mainly by the EU but also by the Estonian government [122]. Since then, the system has continuously improved and is used daily by healthcare providers [122]. It contains services for eReferral, ePrescribings, eConsultation, eSignature, eBooking, eVaccination, or eHealthRecords, including case summaries, radiology reports, and laboratory reports [122]. The nationwide EHR is one of the most used eHealth solutions in Estonia, as it allows the secure exchange of digital health records among different healthcare providers by ensuring interoperability [122]. In Estonia, the eHealthRecords are secured using blockchain.
Another successful service in healthcare is ePrescribing, which also contains drug-drug interaction services. In 2002, all pharmacies had to transmit the prescription information for medication with reimbursement electronically to the National Health Insurance Fund. Since 2010, the prescription data has been issued and stored electronically by the physicians for all the pharmacies [122].
As mentioned above, Estonia has implemented the eHDSI infrastructure, where the ePrescribing/eDispensation service is frequently used in cross-border exchange of prescriptions, particularly with Finland [59].
eReferral is also used to refer patients electronically to other healthcare facilities [122].
In 2020, WHO signed a Memorandum of Understanding with Estonia, where Estonian entrepreneurs and researchers could start working in order to improve the exchange of vaccination data globally due to the fact that the Estonian eHealth project "received recognition by the WHO" [123].
Moreover, all the radiology facilities are obliged to use the central Picture Archiving and Communication System (PACS) for sharing medical images with other healthcare institutions. In addition, the referring physicians have web-based access to the digital

radiology images if they have a contract with the responsible authority of PACS [122].
The patient portal is another service used in Estonia, where the users have access through their digital identity, including mobile ID, smart ID, or ID card, which serves as authentication and electronic signature. Through the portal, patients can access their medical reports and results before or after appointments, decide which data they want to share with the health providers, view the people who have accessed their data, etc. The eSignature can be used by patients and institutions in order to securely sign sensible documents electronically. [122]

4.2.2 Lessons learned

In 2020, WHO signed a Memorandum of Understanding with Estonia, where Estonian entrepreneurs and researchers could start working in order to improve the exchange of vaccination data globally due to the fact that the Estonian eHealth project "received recognition by the WHO" [123].
Moreover, all the radiology facilities are obliged to use the central PACS for sharing medical images with other healthcare institutions. In addition, the referring physicians have web-based access to the digital radiology images if they have a contract with the responsible authority of PACS [122].
Patient Portal is another service used in Estonia, where the users have access through their digital identity, including mobile ID, smart ID, or ID card, which serves as authentication and electronic signature. Through the portal, patients can access their medical reports and results before or after appointments, decide which data they want to share with the health providers, view the people who have accessed their data, etc. The eSignature can be used by patients and institutions in order to securely sign sensible documents electronically. [122]
Estonian digital services in healthcare are well developed and mainly successful. However, some challenges were observed, including the need for a change in professionals for filling out medical documents by using more uniform language; data quality is challenging; general acceptance of hospital personnel to share medical data through the Patient Portal shall be improved; a great emphasis should be placed on improving electronic authentication and security; and the user interface should be improved [122].
When asked what the hardest part was in implementing the eHealth solutions in Estonia during an online discussion about eHealth in Estonia, the Chief Medical Officer of Guardtime, Ain Aaviksoo, answered that the legal framework and clinicians that are not open for innovations were the most difficult parts and the main blocking point [124].
Therefore, it is important to convince users on how they can benefit from the usage of such digital tools and to design user-friendly services in order to also convince less technically ready users to use the eHealth services, according to Aaviksoo [124]. However, Estonia suggests keeping the trust and transparency of the citizens in order to deal with the privacy issue of the sensitive data [124].

4.3 eHealth in North Macedonia

The Republic of North Macedonia is located in the Northeast of Europe and has a population of 1,836,713 (2021) [125]. In 2014, North Macedonia was ranked 16th in the Euro Health Consumer Index, gaining 11 positions compared to one year earlier because of the early development of the eAppointment system, called MojTermin [12].

4.3.1 eHealth solutions

One of the most prominent eHealth solutions in North Macedonia is the MojTermin (MyTime) service, which was started in 2011 [48]. The scalable cloud-based service was implemented to primarily reduce long waiting times for the patient by enabling the online scheduling of clinical appointments [48] [12]. MojTermin is currently operating in all the governmental hospitals and among general practitioners, as well as in some private health institutions. The general practitioners have real-time access to the booking situation of medical specialists and "can book anywhere in the country with only a few mouse clicks" [12]. Nowadays, the system (also called IZIS) includes an electronic health card, an electronic prescription, an electronic referral, electronic scheduling of examinations, and other services [126]. The modules consist of services, i.e., "registering for organ transplantation", "text messaging notifications for appointment times", "shared decision-making on health policy", and contain a real-time dashboard with insight to "the number of requests, referrals, and the most frequent diagnoses or prescribings" [48]. It aims to reduce waiting times in outpatient settings and ensure unified and reliable databases. Moreover, it provides a quick recording of patient data and reduces the administrative work and number of duplicate examinations [126]. The official website of MojTermin provides a section for the patients and the healthcare workers, while the patients can have access to a map of the healthcare providers with free appointments [126]. Serbia has also implemented the Macedonian eHealth system IZIS, consisting of online medical speciast booking and the e-Prescribing service [12]. The Serbian system is named MojDoktor [127].
However, there is no evidence whether a national EHR is already deployed or not. The Macedonian Ministry of Health made an effort to implement the EHR on a national scale between 2009 and 2011 [128]. However, this attempt failed due to poor planning and project management [128]. Dimitrovski et al. investigated the Republic of North Macedonia's general practitioners' readiness to accept and use an EHR system [129]. They found out that ease of use and the presence of supportive infrastructure appear to be the main factors that influence the choice to use the EHR system.

4.3.2 Lessons learned

According to the Ministry of Health of North Macedonia, since the launch of the MojTermin system, waiting times for diagnostic imaging and other services in health institutions have been reduced, and "the minimum working times per physician and per medical device have been identified" [48]. However, there have been technical barriers, such as a

lack of electricity and internet connectivity issues [48]. Moreover, in a 2015 survey, "the doctors expressed the need to improve the patient notification system if their appointment would be cancelled or delayed" [48]. Nevertheless, the Ministry of Health of Macedonia ensured that the system did not contain any issues that could prevent the patients from receiving the acquired health service [48]. The majority of the patients (over 80%) were satisfied with the system, and 70% of them were satisfied with the waiting times at the health facilities [48]. This success can be mainly attributed to firm leadership. The former Minister of Health declared: "I want that system up and running on July 1, 2013; basta!" [12]. Nowadays, the leadership is not so firm, so North Macedonia was ranked 25th in the Euro Health Consumer Index 2018 [12]. Thus, the IZIS system has demonstrated how important strategic eHealth planning is in order to achieve successful eHealth adoption [48].

4.4 eHealth in Slovenia

Slovenia is a country located in Central Europe and has a population estimated at 2,110,547 in 2022 [130].
In recent years, the country has shown continuous engagement in improving electronic health services and health outcomes. Slovenia started with the eHealth project, called eZdravje, in 2005 and finished it in November 2015 [27]. The project aimed to connect and harmonise the fragmented HIS systems and improve the outcome for health stakeholders. It was managed by the Ministry of Health in Slovenia and co-financed by the EU.

4.4.1 eHealth solutions

According to the paper "Analysis of eHealth solutions in Slovenia: A usage perspective" from Rant and Stanimirovic [27] the eHealth solutions being used in Slovenia included ePrescribing, eAppointment, eReferral, eSickLeave, eHealthRecords stored in a Central Register for the Patient Data (CRPD), and the Patient Portal.
ePrescribing was fully implemented in 2016. Despite some difficulties in the early stages, ePrescribing has nowadays become an established solution among stakeholders. It is one of the most successful eHealth solutions in the country, with a high percentage (98%) of usage among gneral practitioners. Some electronic prescriptions are issued by medical specialists as well. The tool contains a database of drug interactions, and the documents are digitally signed. Moreover, patients can access the history of the prescribed and dispensed medications on the Patient Portal. [27]
eReferral was implemented in 2016. Since then, the number of electronic referrals has increased in the country. The physician has the possibility of creating electronic referrals for the patient. The eAppointment service was implemented in April 2017 and allows online booking of appointments for eReferrals from the physician [27]. The appointments can be booked by the medical staff or even the patient himself or herself. This module was established for the eReferral [27].
CRPD is a database that contains patient documents, including hospital discharge

summaries, medical examination reports, or diagnosis records. In addition, CRPD can contain documentation uploaded by the patient himself or herself, such as permission or consent forms. These documents can be accessed through the patient portal. Access permissions to the documentation in this database are regulated by the "Information Commissioner of the Republic of Slovenia".
The Patient Portal, called zVEM, was established in 2017. As aforementioned, this portal offers patients the possibility of accessing their health documents online. Access to the portal is only possible with a qualified digital certificate in order to ensure reliability and increase security in user verification. [27]
Despite the aforementioned eHealth solutions, in Slovenia, multiple telemedicine solutions are offered. Ziva Rant [131] investigated 15 of them and divided them into one of the following groups: "telemonitoring", "provision of healthcare services by remotely connecting patients with a doctor or healthcare professional", and "remote cooperation for the patient's treatment between doctors or healthcare professionals who are physically at different locations" [27]. The services in the telemonitoring group consisted of five solutions and mainly offered remote monitoring for patients with chronic illnesses, such as diabetes mellitus. The second group included solutions for online scheduling of appointments, eSickLeave certificates, or report sharing among clinicians. The third group consisted of seven solutions for remote cooperation between physicians in different places.

4.4.2 Lessons learned

Although nowadays the Slovenian eHealth solutions are broadly used and accepted by the medical staff and the patients, on the way there were some obstacles [27]. Particularly in the early stages, the stakeholders faced some difficulties. Moreover, only a small number of the existing eHealth solutions could be implemented during the period of the eHealth project, which was co-financed by the EU. Rant and Stanimirovic stated that the implementation of even simple national ICT solutions demands immense endeavour [27]. In the eHealth project of Slovenia, high numbers of resources were invested. Moreover, well-coordinated action and persistence were required. The requirements of the stakeholders must be considered in the entire process of the product life cycle [27].
Regarding telemedicine in Slovenian healthcare, the research participants noted some issues, including financing, a lack of a telemedicine strategy, less cooperation between stakeholders, and a lack of awareness among healthcare professionals of the potential of telemedicine [131].

4.5 Summary

All four of the countries investigated in this comparative analysis demonstrate engagement in implementing national eHealth solutions. The common goal of the countries is to digitalize healthcare in various ways. The Republic of Macedonia started the implementation process last among the four in 2011. Denmark started the process first among the four

in 1996. The eHealth initiative was launched in 2005 in Slovenia and in 2008 in Estonia. The two most popular eHealth services, ePrescribing and eReferral, have been introduced in each of the four countries. Another common service is the patient portal. Patients in Denmark, Estonia, and Slovenia have access to their own health-related data and can book appointments online. In Macedonia, patients only have access to a map of medical professionals with free appointments and do not have access to their health records. In three of the four countries — Denmark, Estonia, and Slovenia — the practice of storing health records electronically and exchanging them nationally is widespread. Attempts to implement a national EHR in North Macedonia have previously been made, but they were unsuccessful. Currently, there is no evidence in the literature that healthcare providers in North Macedonia have employed a national EHR.

Additionally, there were variations in the four nations' usage of eHealth solutions. In Denmark, the national EPIC system is adopted as a national EHR. However, although Denmark has been the pioneer in IT-related health services efforts, the EPIC solution demonstrates some issues, including the additional time needed to complete clinical tasks and the slow correction of usability weaknesses, which contribute to user dissatisfaction. Estonia is unique in that its EHRs are secured by blockchain technology. Additionally, all radiology facilities are required to share medical images with other healthcare facilities through the centralised PACS. The WHO recognised the Estonian project for exchanging electronic vaccinations, and as a result, Estonia and the WHO signed a Memorandum of Understanding.

The early creation of the cloud-based eAppointment system, which has reduced waiting times for diagnostic imaging and other services in healthcare institutions, earned North Macedonia distinction from the Euro Health Consumer Index. The booking status of medical specialists is available to general practitioners in real-time, and they can book appointments virtually anywhere in the nation with just a few mouse clicks.

Slovenia has a large number of national eHealth solutions available and in use, including the exchange of diagnosis information, medical examination reports, and summaries of hospital discharges. However, during the time of the eHealth project, which was co-financed by the EU, only a small number of the current eHealth solutions could be put into practice.

Common takeaways and recommendations from Denmark, Estonia, and Slovenia included the necessity of involving users and taking stakeholders' needs into consideration at every stage of the project. The users must be convinced of the benefits of eHealth solutions in order for them to be accepted. The citizens' trust and transparency must also be maintained in order to address the privacy issue. The legislative structure and the clinicians' acceptance were the biggest obstacles in Estonia, while North Macedonia has shown how crucial strong leadership and tactical eHealth planning are. Other issues, particularly emphasised in Slovenian telemedicine, included funding, a lack of a telemedicine strategy, and less coordination amongst stakeholders. Furthermore, the Slovenian example teaches us that even the most fundamental national ICT solutions require significant work to implement.

CHAPTER 5

Review of the Albanian healthcare digitalization

This chapter provides a review of Albania's healthcare digitalization based on published works, journal papers, and government videos. It also provides details on the country's general digital development and contains an evaluation of the national healthcare system in Albania. This chapter also presents the governmental strategy for enhancing digital health by 2021–2030 in Albania.

5.1 Digital Development in Albania

In recent years, there have been efforts for digital transformation at a national level from the Albanian government. In 2020, Albania was ranked 59th out of 193 countries in the E-Governmental Development Index and 36th in the E-Participation Index [132]. Overall, Albania is showing average scores in the government-centric digital transformation [132]. The digital agenda of Albania 2015–2020 included the following three main objectives: "increase and promote public e-services for citizens and public administration", "increase of ICT used in education", and "improve the national broadband infrastructure" [133, 132]. The governmental portal e-Albania was created in 2007 [133]. It enables citizens, businesses, and public administration employees to have online access to public services according to the principles of the Open Government Partnership initiative and is the single access point for public service delivery [133]. The portal can be accessed through a web or mobile application and is managed and coordinated by the National Agency for Information Society (AKSHI) [134, 133]. The authentication process is based on the single-sign-on strategy [133]. The citizens can access the platform by using their national identification number and a password, while the businesses can log in with their unique identification number and password [133]. The platform is connected to the government gateway, which currently interacts with 48 electronic registers [133].

In order to "create and maintain infrastructure for electronic communication for the public administration and e-governance", several laws were developed [132]. Two of the most important legislative acts include the data protection regulation law no. 9887 from March 10, 2008, "On Personal Data Protection" by the Office of the Commissioner on the Right of Information and Data Protection, and "On Approval of the Regulation of Access to Electronic Public Services" by the Council of Ministers Decision no. 455 from September 13, 2017 [132].
In 2020 72.2% of people in Albania used the internet [132]. Although the rate is below the European average (European average in 2020 was 84.9%) the number of users with internet access is increasing in the country [132]. According to Eurostat Albania had one of the lowest percentages of citizens with digital skills in 2019 with only 21% of the Albanians between 16 to 74 years old having basic digital skills [132].

5.2 National Healthcare System of Albania

The Albanian healthcare system is mainly public and concentrated in the capital city, Tirana. Like in most European countries, the governmental healthcare service is organised into three tiers: primary care, secondary care, and tertiary care. There is a referral system that runs from the bottom to the top of these three healthcare levels. The primary healthcare level includes services provided at health centres and polyclinics [16]. The family doctor can be freely chosen by the residents of Albania and can be changed once a year. The general practitioners should provide services in quality and quantity "in accordance with the healthcare law, the law on drugs, the professional protocols adopted, the code of ethics in Albania, and medical deontology, standards, and norms. Moreover, doctors and nurses should consider the law No. 9887 on the protection of personal data, dated March 10, 2008" [135, 136].
The secondary healthcare level includes regional hospitals. In Albania, there are around 413 public clinics that offer primary and secondary healthcare services [137].
The tertiary healthcare level consists of the University Hospital Center "Mother Teresa" (QSUNT), located in Tirana, which is the only governmental hospital in the country that offers tertiary services [138]. As the biggest healthcare institution in Albania, "QSUNT offers outpatient health services for about 300,000 people per year, hospital services for over 80,000 cases per year, and emergency services for over 260,000 people per year. The hospital has a capacity of 1450 beds and provides medical assistance for an average of 400 daily inpatients". The university hospital has a total of 2967 employees, of whom 1808 are clinicians. [138].

The Health Insurance was established in 1994 and consists of a mix of the Bismarck and Beveridge model [136]. It was institutionalised based on the Law "On Health Insurance in the Republic of Albania" (No. 7870), 13.10.1994" [16].
The public healthcare system is financed mainly by mandatory health insurance, which consists of payments from employees (11,2% of the contributions) and employers (16,7% of the contributions), but also by voluntary contributions, as it is based on the principle of solidarity and is granted by the state budget [136]. The health insurance scheme aims

Figure 5.1: A building in the University Hospital Centre "Mother Teresa" (QSUNT) [Image: G.Hofmann]

for health coverage of the population and refunds the governmental healthcare services, the prescription medication from the list of reimbursable drugs [139] for the insured citizens, and covers the expenses for some approved medical services in private facilities. The health insurance scheme "is based on the model of single-payer", the FSDKSH, which manages the funds "in accordance with national healthcare policies". [136, 140, 16]
The leader of all the levels in the public healthcare providers is the Ministry of Health and Social Protection (MSHMS), which is "responsible for the policies and strategies of the health system, for its regulation as well as for the coordination of all actors inside and outside the system" [16].
In each district, the health services are coordinated by its Department of Public Health (DSHP). In addition, in the 12 prefectures (central regions), there is also a hospital directorate and a primary healthcare directorate, which are separately organised. In Tirana, there is a pilot project where the primary health service has been reorganised and the Regional Health Authority has been created. The project aims to create regional authorities for the coordination of the operation of health services at the regional level. After the completion of the pilot project, the existing organisation will be reviewed [16].
There are some other important national healthcare organisations led by MSHMS, including "Public Health Institution", "National Drug Control Centre", "National Blood Transfusion Centre","National Centre for Child Development and Rehabilitation", "National Centre for Quality, Safety, and Accreditation of Health Institutions", "University Dental Clinic", and "National Biomedical Engineering Centre" [16].
The private facilities include most of the pharmaceutical and dental services, but also some diagnostic clinics, labs, and hospitals, which are concentrated in Tirana as well [16].
In recent years, there has been an accumulation of investments in new private hospitals, diagnostic clinics, or labs offering a full range of services, which are also concentrated in the capital [16].

5.2.1 Review of the Albanian healthcare system

Since the fall of communism in 1990, Albania has gradually recovered and marked positive developments "driven by economic growth" [141]. According to a survey of

the Euro Health Consumer Index 2018, Albania demonstrated high accessibility scores for visits to primary care doctors [12]. However, the Albanian healthcare system still faces some considerable challenges and barriers. Referring to an article in Health for all project (HAP) one of the issues includes the shortage of a health workforce unable to respond to community health needs, especially in the primary healthcare environment [141]. Reasons for this situation may be "low rewards or unattractive work environments" [141]. High rates of migration among health professionals are another challenge faced by the Albanian healthcare system. According to the Doctor's Order [142] in Albania, during the period 2013–2017, 762 physicians requested or received the certificate of good conduct from the Doctor's Order, which can help them seek a job abroad. This could indicate that they may have left the country. In addition, the Albanian nursing professionals are being recruited from Western European countries, "specifically in Germany, in order to address the shortage of health workers in their countries" [141].

Another barrier to primary healthcare consists of the uneven distribution of health professionals across the different country areas [141].

Schindler et al. [143] conducted a quantitative study by involving 954 patients in two regions in Albania, Fier and Diber, in the private and public healthcare sectors. The study aimed to find out patients' perspectives on non-clinical factors of quality of care with healthcare providers, which were found to be mostly satisfactory.

However, patients' participation in the decision-making process was considered of low importance for the enhancement of healthcare quality by the patients themselves. So, the authors suggest that the relationship between healthcare workers and their patients should change to a more cooperative model and not remain 'paternalistic', in order to raise awareness for more autonomy for the patients.

Mechilli et al. [144] explored the challenges and barriers faced by the primary healthcare staff in the treatment of patients with multi-morbidity in Albania, which has a high prevalence (62,7%) in the country. In order to achieve results, a qualitative methodology was used, including semi-structured interviews with 36 nurses and physicians active in primary care centres in Vlora in the period 09/2019–01/2020.

The study identified issues at the levels of patient, primary healthcare centre, primary healthcare team, secondary healthcare, and healthcare system.

On a patient level, some communication issues were indicated, which, according to the primary healthcare staff, may occur as a result of the culture and low health literacy level of their patients. Firstly, some patients do not adhere to the proposed treatment, as they usually "overestimate their health state". Secondly, patients face difficulties accepting the referral procedure, so the primary healthcare workers spend a lot of time explaining to the patient how it works. Thirdly, there is a shortage of healthcare workers, which may delay medical care (consultations or examinations) for patients. In addition, the nurse's role is underestimated by the patients.

On the primary healthcare centre level, the main reported issues were a lack of appropriate materials and equipment, inadequate training in managing multi-morbid diseases (particularly among nurses), and appropriate infrastructure. For example, the centre does not have hand disinfection or sterilised gloves. Moreover, one general practitioner

emphasised the increasing number of physicians leaving the country and the low number of physicians following the specialisation of family medicine.
The main issue identified on the primary healthcare team consisted of a lack of ethics in communication in the doctor-nurse relationship. The nurses complained about doing secretary work and a lack of autonomy. They felt underappreciated by the doctors. Other barriers consisted of a lack of collaboration among team members and an unequal distribution of work volume.
In addition, the lack of coordination and collaboration was an issue among general practitioners and specialists at the secondary healthcare level. The most reported difficulty was the aforementioned referral system, as the patients usually do not receive formal documents for medication prescribing and diagnosis from the specialists, which causes problems for general practitioners to enter the recommended medication from the physician on their ePrescribing system, which leads to disputes between patients and physicians.
In the last two decades, there have been some initiatives for enhancing Albanian healthcare and the health of the population, including "Urdhri i Mjekut" (Doctor's Order) [142] and the HAP [141]. Like in some other countries, the Doctor's Order was created on the initiative of the doctors in order to protect the healthcare professional's interests and the patient's rights [142].
The Doctor's Order is independent from the government and is based on Law 7708, dated May 18, 1993, "On the Creation of the Order of Doctors" [142].
HAP is implemented and funded by the Swiss Agency for Development and Cooperation [141]. This project is based on the Alma-Ata Declaration "Health for All" [6] from an International Conference for Primary Healthcare in 1978 and is a milestone in the field of public health. This declaration urged promoting health for all people around the world as a fundamental human right and emphasised the importance of primary healthcare in achieving this goal. Likewise, the HAP project aims to promote primary care in Albania, especially by connecting the community to general practitioners, including rural areas, and raising awareness of the importance of healthy lifestyle behaviours among the population.
The project is implemented by the Swiss Institute for Public Health and Tropical Medicine (Swiss TPH) through the HAP Center. It involves the government, other healthcare stakeholders, and the citizens and consists of two phases.
The first phase of the project, HAP-1, took place between 2015 and 2019 in the prefectures of Diber and Fier [141]. During the first phase, the health care system in these two prefectures experienced some improvements.
It was shown that the quality of healthcare investigated in the cities Fier and Diber has improved by 20%-30%, which is mainly based on the fact that general practitioners have followed more guidelines and protocols for clinical evaluation of patients with NCD based on the trainings offered by HAP [141]. In addition, the primary healthcare infrastructure has improved, the citizens have enhanced access to healthcare, and the patients have participated more, which increases compliance and awareness.
1530 general practitioners and nurses in primary care were equipped with the medical

supplies bag necessary for the "head-to-toe" assessment of acute or chronic patients. The bag includes 17 medical instruments, such as a digital thermometer, otoscope, ophtalmoscope, oximeter, or glucometer. This bag was embraced by many general practitioners, as it supports them in performing a more complete visit and enabling better patient care [145].
In terms of patient participation, HAP organised an innovative hands-on approach campaign called "PerSHENDETje" [1] for health promotion in the prefectures of Diber and Fier. This campaign aimed to raise awareness about NCDs among the community and increase the number of visits to the local primary healthcare centres for preventive checkups.
Another main focus of the project was to promote home-oriented care of patients by training nursing professionals in multiple nursing procedures and treatment nursing protocols in order to enable a standardised and planned-oriented healthcare service. A database of patients was created for classifying patients who will receive care at home and for defining the weekly nursing plan. According to a nurse, home care is beneficial for the patients, as they do not need to travel far to receive the healthcare services anymore [146].
Moreover, on March 2022, a new professional master "Family Nurse" was established in order to offer a more qualified service at home, addressing the need for care in the trend of an ageing population in Albania [147].
The second phase of HAP, HAP-2, started in 2019 and will be finished by 2023 [141].

5.3 Reviewing eHealth in Albania

In the past decade, investments in health technologies and new medical devices have increased in Albania by enhancing access to healthcare [148]. The government decided strategically in 2012 to embrace industry standards for the nation's developing eHealth sector [19]. Since then, the government's endeavour to digitalize healthcare has been reported in multiple articles [18] [149] [19] [9]. The goals of digital health in Albania include "Increasing patient satisfaction", "Reducing bureaucracy", "Increasing the efficiency of core services", and "Improving governance" [132]. The former minister of health announced in March 2017 that the investments made to date for the digitalization of Albanian healthcare have reached the amount of 36 million euros, which corresponds to (as he stated) 12 euros per citizen and "is not little for the Albanian opportunity" [150].
The European Union has published an article [9], which informs about the development of the EHR infrastructure in Albania. This way, the country would be prepared for the EU legislative framework on dHealth and would be able to exchange health data with other European countries through the eHDSI in the future.
In 2021, a cross-border project called PHASE was deployed between Italy, Montenegro, and Albania [132]. The project aims to develop the eHealth sector with innovative electronic tools [151]. Moreover, the e-intervention platform "I Fight Depression Tool" was developed in three community mental health centres in Albania [132]. The following

[1] Pershendetje means "Hello"; Shendet means "Health"

subsections introduce the eHealth tools mentioned in literature or on the governmental website and are related to Albania.

5.3.1 National Electronic Health Record

In 2015, Albania declared to have deployed a national EHR system in the country in the eHealth European Survey of the WHO European Region [18]. In this survey, 27 out of 46 responses, or 59% from the WHO European Region replied yes to the question of whether they have a shared EHR system in the country or not. Niaksu et al. [19] published an article in which the authors reviewed the implementation of the cross-institutional EHR system in Albania, which was launched in 2014 and rolled out in 2016 by the Ministry of Health with the support of the Austrian government.
In this article, the authors pointed out the issues before the implementation of the nation's EHR in Albania, which mostly consisted of low computer literacy, a lack of network and computer infrastructure, budget limitations, and a lack of national standards, including terminology and protocols for data exchange.
Since 2011, only 4 public hospitals had started the deployment of a HIS system called "Kosto spitali", which was a standalone software mainly used to collect statistical and financial data by manually importing and exporting them, while the healthcare providers were not able to communicate with each other. Moreover, universal patient identification and a localised classifier were missing and needed to be created.
So, in 2014, the Ministry of Health made the decision to implement the Austrian solution COST, which was compatible with the EHR profiles recommended by the EU commission, while the chosen architectural model for HIE was a hybrid model—a combination of centralised (service-oriented architecture) and decentralised (federated architecture) models. This architecture offered, i.e., "a local master patient index", "XDS registers", and "repositories" in each healthcare facility. It also allowed asynchronous exchange of local and central nodes, which ensured communication even with limited bandwidth. However, Niaksu et al. indicated that the hybrid model was more expensive to implement and maintain than a fully centralised one.
According to the results of this study, the governmental healthcare providers were equipped with 2300 new ICT hardware items, the national EHR was deployed in 79 public healthcare providers, and 2740 end-users were trained to use it [19]. The eHealth services can interact online with other IT systems, including ePension, social assistance, the tax register, and the civil register [132].

5.3.2 ePrescribing

ePrescribing was one of the first national eHealth technologies made available in Albania. In order to increase transparency, the ePrescribing pilot project in Durres was intended to digitise prescription writing and dispensing and replace handwritten prescriptions with reimbursement [152, 153]. The project was successfully accomplished between 2015 and 2016 [154]. During this phase, most of the general practitioners and pharmacists were equipped with the necessary hardware and telecommunication infrastructure, as the

former minister of health has stated [150].
The objective was to implement ePrescribing across all public healthcare providers in the nation following the Durres pilot phase's success. So, the system was introduced to general practitioners in 2017 [152, 154].
The former minister of health announced that the reason why ePrescribing was introduced first was that there were financial abuses found from time to time [150]. According to the Ministry of Health's Directorate of Health Care Progress, the service of treating patients with medication has been improved through the use of the electronic system [153]. "The use of appropriate protocols, drugs, and dosage forms," he said, "ensures that Albanian patients receive quality care in accordance with the universal health principle" [153]. The web-based interface is available for pharmacies that have a contract with the FSDKSH and contain mere reimbursement medications for chronic patients [152, 154]. The medication without reimbursement is not yet stored electronically [153].
The digital prescribings are signed electronically [155, 156]. The system allows the fund to track, manage, and refund the electronic prescription [152]. The general practitioner can issue ePrescribings for medication with reimbursement for the patients by selecting the medication from the medication list, which is then sent to the database. The prescription is diagnosis-related. The health card serves as the patient's identification, and it also serves as the basis for determining how the patient will be compensated. The patient receives a five-character code from the general practitioner, and with this code, they can get the medication in the pharmacy [153].

5.3.3 eReferral

In order to improve doctors' work and shorten people's waiting times, eReferral was launched in 2017 to eliminate unnecessary walking for citizens [150]. The former minister of health emphasised the main goals of digitalizing Albanian healthcare with the introduction of eReferral in March 2017, including time savings for both citizens and healthcare providers, enhancement of transparency and self-accountability for clinicians, and decrease of burden for the citizen, so they do not need to take the heavy folder with medical documentation [150]. Additionally, this system would contribute to an increase in people's trust in the health system and enhance the image of the health system [150].
The Ministry of Health and Social Protection explains in a Youtube video that the electronic referral works as follows [157]. The referral system can be accessed via the menu "Recommendations" in the system called e-Examinime by general practitioners. The patient identification number must be typed by the user in order to add an electronic referral. The patient's demographic information is then automatically filled in by the system. The general practitioner must fill out some information, including the referral number, the date of the referral, and the rationale for the referral. The institution where the patient is referred must also be chosen, along with the diagnosis, specialisation, date, and time. A 5-digit code is kept once the general practitioner saves the recommendation, and the patient can use it to check in at the hospital's front desk. The hospital admission can select the physician for the patient, as the physicians that have free appointments on that date and time are shown in the list [157].

5.3.4 eSickReports

Since August 2022, general practitioners are required to provide eSickReports, which patients no longer need to physically submit to their employer or insurance company [158]. According to a general practitioner, this approach saves both the patient's and the doctor's time because adding a sick report online is quicker and more convenient than writing one by hand, and it also prevents abuse of the sick report process [158]. The patient's ID and the duration of the report's validity must be entered by the general practitioner in order to obtain a sickness certificate through the web interface [158]. Additionally, the general practitioner must electronically sign all certificates and record the register number and the diagnosis [158]. When a new certificate is issued, a 5-digit code is generated, which the general practitioners give to their patient [158]. The sick reports are then sent directly to the patient, the insurance company, and the employer [159]. The patient's sickness certificate can be accessed in the "My Documents" section of the patient's e-Albania profile [159]. The employer can search for the sickness certificate online at https://kontrollo.eraporte.gov.al/ [160] by entering the employee's ID and the 5-digit code that the patient obtained from the doctor [160].

Figure 5.2: An advertisement of eSickReports in a bus station in Tirana [Image: G.Hofmann]

In the near future, it is planned that this service will also be deployed in public hospitals [158]. Among others, it is planned that the birth reports for pregnant women will be issued online by the gynaecologist and will be sent directly to the insurance, so the women can receive the payment [158].

5.3.5 eSignature

As mentioned in the previous subsections, electronic signatures are used for the existing eHealth solutions in Albania [155, 156, 158]. Mr. Beqaj stated in his speech that the electronic signature is a crucial component of the eHealth program. The former minister of health announced in March 2017 that, in regard to authentication with electronic signatures, public health is the most advanced sector in Albania. Thus, stamps and signatures will gradually not be mandatory anymore [150]. Initially, the eSignature was realised with an USB and was then replaced by the SMS [161, 162]

5.3.6 Health Information System

Another public system called Health Information System for public Healthcare (SISP), translated as the "Public Health Information System", is offered for the upper healthcare levels. The web-based system is implemented by ONI Sh.p.k and is created in cooperation with the staff of the QSUNT in Tirana. It is supported by the MSHMS and consists of several modules [163].
The objectives of SISP include the computerization of the clinical records for inpatient and outpatient settings (such as anamnesis, objective examination, diagnoses, procedures, expenses for drugs and materials, blood and plasma transfusions, nutritional diet, laboratory and imaging examinations, and expenses in the operating room), the computerization of the pharmaceutical service, such as the circulation of drugs and medical materials, and generating statistics and reports that can be accessed by governmental institutions, such as MSHMS or FSDKSH [164]. The project objectives of a technical nature included the database creation and maintenance for Diagnoses Codes (ICD-9), Procedural Codes (Procedure Coding System (PCS)), Services Provided Codes (LOINC), Medical Product Codes (Anatomical Therapeutic Chemical Classification (ATC)), Personnel Codes (SISP), Facility Codes (SISP) [164].

5.3.7 Patient portal

As described in Section 5.1 the governmental platform e-Albania offers a category for health and social protection [165]. This category includes, i.e., services around the health card and the history of patients online prescribing and referrals. Moreover, the patients can apply to get the COVID certification, change the general practitioner, or access the list of drugs and their prices, just to name a few of the offered services.
According to the formed minister of health, the website of the compulsory fund includes a search engine where citizens can find out where their health centre is based on their personal number [150]. This is a useful feature, as "most people who are still healthy, even in middle age, do not have a very transparent relationship with primary health care", he added [150].

5.3.8 Telemedicine

Some public hospitals in Albania are equipped with telemedicine centres, where clinicians and their patients can connect through video call with a medical specialist from another healthcare facility. The Shkodra regional hospital has a telemedicine centre so that diabetic patients and their doctors can consult a higher-level healthcare specialist online about therapeutic treatment and the number of insulin pens without having to travel to the capital city [166]. Beyond that, there are private initiatives that aim to connect patients with doctors at a distance by offering online consultations in Albanian. Some of them are the platform "Portokalle" [167] or the website "Klinika Digjitale" [168]. "Portokalle" involves around 250 doctors from 27 medical specialties. On these two platforms, the patient can upload his or her clinical documents, so the doctors s/he will consult online can have access to his or her medical records.

5.4 Digital Health in the National Health Strategy 2021-2030

The governmental document of the national health strategy 2021–2030 contains five specific objectives for the digital transformation of healthcare in Albania, which will be described in the following paragraphs [169].
The first specific objective aims to enhance patient empowerment. Part of this agenda contains improving digital literacy among patients and educating them in using digital health services, further developing the patient portal with a central collection of information "on patients rights, the services available, and their eligibility criteria, as well as information on how to report or what else to do in case of suspected corruption" [169]. Additionally, patients will be able to access their medical records and choose which of them to share with other healthcare professionals through this unified platform. They will also be able to directly book an appointment with a healthcare provider. The first objective also aims to train healthcare professionals on how to use digital tools, about data protection and privacy, as well as how to use such tools to empower their patients.
The second specific objective aims to modernise the health technology infrastructure by further developing eHealth services with a view to supporting the simplification of care services, empowering patients, and strengthening evidence. It aims to develop the national system of digital medical images, create interaction with private systems, and develop the existing medical applications under the iOS and Android operating systems. The government plans to execute the following operations to reach this goal: "Creating the first hospital information model and implementing it in the first regional hospitals; expanding the use of the digital system in hospital structures; updating and strengthening the digital health governance model; and creating the national mission of digital health in Albania" [169].
The third specific objective deals with the assessment and use of health information for decision-making in the management of healthcare services and public health protection. This part of the agenda aims to collect data, including clinical data, data regarding

the patient's journey through the system, and the amount of time between the referral and the appointment. However, anonymization measures should be enabled, in order to protect the data. This objective also aims to implement the international classification of diseases ICD-10, based on international and WHO standards.
The fourth specific objective deals with the creation of national health accounts and annual publication of results. The national health account is "an international methodology for assessing important elements of health financing across all funding sources, costs, services, and delivery models" [169].
The fifth specific objective aims to enhance capabilities for scientific research and publish scientific health evidence, in order to increase accountability and transparency in the decision-making process while also enhancing the health system's performance and efficiency.

5.5 Summary

The Albanian government has made efforts in recent years to modernise the country's digital infrastructure in order to increase and develop public e-services for residents and the public administration. Public services can only be accessed through the official portal e-Albania, which may be accessed through a web or mobile application.
On the other hand, in Albanian healthcare, there are initiatives such as the HAP project, which aims to enhance primary healthcare in Albania, particularly through connecting the general public to general practitioners in remote regions and increasing public awareness of the significance of adopting healthy lifestyle practises [141].
Digital health projects in Albania seek to enhance governance, reduce bureaucracy, improve the effectiveness of critical services, and raise patient happiness [132]. The Albanian cross-institutional electronic health record system was introduced in 2014. Some eHealth technologies, primarily utilised in primary healthcare, have been adopted nationwide in governmental institutions and include ePrescribing, eReferral, and eSickReports. The given medical documents are digitally signed. Additionally, there is a patient portal where patients can view the history of their electronic prescriptions, referrals, or sickness certificates. Some public hospitals are equipped with a telemedicine centre for online consultations. Beyond that, there are platforms, such as "Portokalle" [167] or "Klinika Digjitale" [168], which offer online consultations in Albanian. For the federal hospitals, an information system called SISP is also available [163]. The computerization of pharmaceutical services, the computerization of clinical records for both inpatient and outpatient settings, and the creation of statistics and reports that governmental entities may access are among the goals of SISP.
The Albanian National Health Strategy 2021–2030 contains five objectives that aim to further develop and modernise digital health, including empowering the patient, modernising the health technology infrastructure, assessing and using health information for decision-making and important elements of health financing across all funding sources, and enhancing the capabilities for scientific research [169].

CHAPTER 6

Reflections of the healthcare stakeholders

This chapter mainly consists of the evaluation and reflections of the 25 involved healthcare stakeholders about the thesis-handled topic based on the conducted interviews. It comprises the stakeholder's perspectives considering the benefits and opportunities, issues and challenges, as well as ideas for improvement on the existing Albanian eHealth solutions.

6.1 The national eHealth solutions

The most prominent current national eHealth solutions (2022) in the governmental sector include a central register for patient data, eReferral, ePrescription, and eSickLeave. In addition, eCertification for COVID-19 vaccination and tests can be issued digitally and were mainly used during the pandemics in order to enable fast access to these findings for the citizens and facilitate their travel. Moreover, the patients have partly access to their health data through the national portal e-Albania, including the list of diseases and history of referrals and prescribing. All the eHealth solutions can be accessed online through the web interface, so there is no need to install the software locally on the PC. The existing systems use the citizen's national ID for patient identification.
The national electronic health record has been implemented in the past based on industry standards [19]. The Albanian nationwide implementation of EHR started at the end of 2014 and finished in 2016. However, this eHealth service is currently not operating in public healthcare institutions for unknown reasons. Thus, there is a lack of digital health records at all healthcare levels in public facilities, while the records mainly remain handwritten in registers and collected in physical folders. Likewise, the discharge summary, which includes important clinical information about a patient and serves to inform aftercare providers, has not been digitalized yet and is mostly given to the

patient in paper format. Some governmental hospitals have already adopted the internal web-based Hospital Information System, called SISP, which is mainly used for accounting and billing purposes by the hospital admission. On the other side, hospitals in the private sector were equipped with their own internal hospital information systems, which contained a lot of clinical information and could be accessed and recorded by the clinicians. However, the information recorded in private hospitals has not yet been exchanged with other facilities and remains within the institution.
The following table 6.1 provides an overview of the eHealth solutions used in the country, as well as the stakeholders that use them.

eHealth solution	Stakeholder
Central register for the patient data	Public Facilities
eReferral	General Practitioners, Hospital Admission, Hospital IT, Patients
ePrescribing	General Practitioners, Pharmacists, FSDKSH, Patients, MSHMS
eSickLeave	General Practitioners, Employer, Employee, FSDKSH
eConsutations	Regional Hospitals, University Hospital
SISP	Governmental Hospital, Public Health, MSHMS, FSDKSH
Internal Hospital Information Software	Private Hospitals

Table 6.1: Overview of the existing eHealth solutions in Albania

The next sections will reflect the benefits, possibilities, issues, and challenges based on the reflections of the study's participants. Moreover, they will describe the participants ideas for improving the current state of healthcare digitalization in Albania. The computer usage in healthcare institutions will also be described in the next section.

6.2 Computer usage in healthcare institutions

The computer usage and time spent with the computer were heterogeneous among different healthcare levels or sectors. In primary healthcare, the general practitioners reported using the computer constantly in their work to handle the aforementioned existing national eHealth services. Accordingly, computer usage is high in the health centres during patient encounters. The general practitioners were equipped with the necessary ICT infrastructure.

> *In health centres, computer use is from 8:00 to 14:40 ... For primary healthcare, the prescription system, the referral system, the report system, the*

> *referral system for laboratory and imaging examinations are all digitised. In our country, the only primary facility that has not yet been digitised is the primary psychiatric system, which has not entered the system, and they still work by hand, making referrals, etc. manually. The health records of the visits are not yet entered in the system.* (General Practitioner, Health Centre)

In higher levels of public healthcare, physicians claimed to use national eHealth services or other digital solutions to handle the health information of their patients rarely. Thus, most of the clinical information still remains documented on pieces of paper or paper registers. Nevertheless, physicians from particular specialties reported using the computer more frequently than others. Mostly, it was used for laboratory, radiology, or treatment procedures to handle the relevant clinical data in the fragmented software of the medical device and manage the findings. However, this information was not shared electronically with their colleagues or with the patients.

> *I use the computer 60% of the time because we depend on it for the work we do in our unit with the radiology images.* (Physician, University Hospital)

Figure 6.1: The emergency building in a regional hospital in Albania [Image: G.Hofmann]

One physician reported using the computer to get information about specific diagnoses and research.

> *In terms of percentage, I can't say, but we only click for special diagnoses or situations for which we need to get simultaneous information for a specific diagnosis.* (Physician, University Hospital)

One physician from a regional hospital reported rarely using the computer, only for imaging purposes. They currently save only the patient data and ultrasounds locally on the computer but do not record any clinical data.

> *I use the computer very little during work, only for imaging, so I can see scanners and the magnetic resonance images that interest me, which is a work*

> *of a couple minutes ... We don't use the computer for medical records at all, but we need it for our work regularly. We mainly save the ultrasounds on the computer and the patient's data, but not any registration for admissions or other clinical data.* (Physician, Regional Hospital)

The time spent with the computer among nurses differed between the secondary and tertiary healthcare levels. Since the module of room management in the HIS software SISP was not deployed among regional hospitals, nurses in regional hospitals did not use the computer as much as the nurses in the university hospital. In the tertiary hospital, nurses used the computer more intensely to record the clinical information of the patients written on paper by the physicians of their department or to manage the rooms and medications.
The hospital admissions receptionist used the computer during the entire working time in order to handle the eReferrals and create appointments for the patients. In some public hospitals, the hospital admission was also used to record the patient data in the internal software SISP, which mainly served billing purposes for the hospitals.
On the other side, participants from private hospitals reported using the computer more often compared to their colleagues in public hospitals and had a higher level of electronic recording of their health information. They admitted to using the computer around the clock for accessing and recording clinical information on the internal HIS software of the hospital.

> *We have our own hospital information system, where I have to document everything electronically. So I use the computer all the time.* (Physician, Private Hospital)

However, the internal hospital system in private facilities does not yet support information exchange with other healthcare institutions. The physicians from private hospitals only had access to patient information recorded within their own institutions. Sometimes, findings from other hospitals were scanned and uploaded to the patient's medical files, or the relevant information was typed manually into their software in order to store the information digitally.

6.3 Benefits

The following subsections will describe the benefits of the individual existing eHealth solutions.

6.3.1 ePrescribing

Based on the interviews with the participants, ePrescribing resulted in the most beneficial eHealth solutions compared to the other existing tools among general practitioners and pharmacists. The majority of pharmacists and general practitioners mentioned multiple

reasons for this success, including saving time, reducing medication errors, increasing patient safety, promoting transparency, and ease of use.
Three participants stated that the system has been gradually improved since its introduction three years ago and has now reached a level of maturity. Another improvement was the eSignature, which was deployed one year ago.

> *We have been working with this system for about three years, and it has only gotten better. We are happy with it. The electronic signature happened last year, which was a further improvement.* (Pharmacist)

In particular, the pharmacists were satisfied for several reasons. Firstly, ePrescribing saves time, as the sum of reimbursed prescribing for the compulsory insurance is automatically calculated by the system. A procedure that took them a lot of time, as they used to calculate the sum of all such invoices with a calculator.

> *It is unprecedented ease. I mean, I also worked at the time when we wrote recipes one by one and did the sums with a calculator, but now imagine you have to write 100 prescriptions one by one.* (Pharmacist)

With ePrescribing, the pharmacists stated that there is no need to do calculations by hand anymore, as the medication amount left (available in the warehouse) is calculated automatically by the system. They can now show the amount of money made with the prescriptions with reimbursement at any time with one click in the system.

> *The electronic pharmacy system has saved us a lot of time since we used to have to write everything by hand, including the recipes, the value per head and do calculations (sometimes complex multiplications and divisions), which have wasted our time endlessly all day... Apart from that, we had to check all the prescription data: date, first name, last name, diagnosis, category, signature, seal, institution, and doctor, which was a lot of work.* (Pharmacist)

Moreover, in the past, pharmacists had to record the details of the prescriptions by hand in several places. Nowadays, there is no need to write the articles' names manually, as they are centrally imported from the warehouse into the system.

> *We used to execute this type of recipe by hand. In other words, the doctor wrote the prescription, recorded it on the card, then took it to the pharmacy, and we recorded it in several places. That is, the relief is extraordinary, even the invoices, which are now thrown directly without writing the names of the articles. Directly from the warehouse, it goes to me in the system.* (Pharmacist)

Additionally, the system automatically removes the drug from the system when the pharmacist executes the prescription, so the amount left of that particular medication is automatically calculated.

> *I open the patient's code, if we do not have the amount of medication in the system in the state of the warehouse, we cannot execute that prescription. The entries come from the warehouse, and we simply give them "Withdraw", because otherwise I will not execute the recipe ... And the moment I execute the recipe, the system will automatically calculate the amount left in pharmacy. The moment I dispense the recipe, it automatically removes the drug from the system.* (Pharmacist)

The general practitioner can then determine in his or her system whether or not the prescription has been executed for the patient. At the same time, the patient can access the full history of his or her prescribed and dispensed medication via the governmental portal e-Albania. Furthermore, the government can monitor the executed electronic prescribings and also access the declared medications in the pharmacies warehouses.

> *Each pharmacist works with her or his personal data because we have a digital signature. When we do the confirmation, we get a confirmation code on our smartphone for each recipe. A unique code is generated for each recipe that I execute.* (Pharmacist)

With the deployment of ePrescribing, there was no need to print the lists of the indicators and prescribing invoices, which the pharmacists used to carry in large folders, as they are now accessible in the system for the authorities. ePrescribing enables the fast generation of statistics.

> *We used to print the lists of indicators and the statement of invoice. Now we don't only print the lists of indicators anymore; the prescriptions that we used to print and carry in large folders are not necessary anymore. That is, this system is many times better.* (Pharmacist)

Another benefit of ePrescribing, which was mentioned several times by the participants, was the error reduction of the medication.

> *With the electronic prescribing, the errors are minimised and the misunderstandings with patients are eliminated.* (Pharmacist)

In addition, the majority of general practitioners and pharmacists commented that the system is easy to use, which makes it more accessible for people with lower digital literacy skills as well.

> *The demographic data of the patient is already in the system. I just need to select the medication and the dose. It is very easy to use.* (General Practitioner, Health Centre)

Other points of satisfaction reported mainly by general practitioners and pharmacists regarding the existing eHealth tools were the fast technical support, the training, and the communication for each change made to the system. The trainings can be accredited by the [170].

> *We have technical support, which is located at the fund's offices where the servers are, and if we have any problems, we contact them and they help us.* (Pharmacist)

Online trainings were also offered, so users who are not living in the capital city also have the possibility to conveniently participate in training courses without needing to travel.

> *We did multiple training sessions before we started to use this system. We have done training several times, and we continue to do it for every change that is made. They invite us to participate in online training.* (Pharmacist)

Considering the aforementioned benefits reported by the participants, ePrescribing can be considered one of the most successful existing national eHealth tools.

6.3.2 eReferral

eReferral is another frequently used service in the governmental sector whose importance was recognised by the participants. The main advantage of the eReferral tool is that it achieves efficient communication among public healthcare providers. Some of the other most frequently mentioned benefits of this tool are introduced in the following paragraphs. Firstly, according to the hospital IT employees, the admission eReferral increases satisfaction for both patients and clinicians, as it prevents patient queues in public hospitals and decreases waiting times for patients. Before the implementation of eReferral, the recommendations were handwritten by the general practitioners, and the patients gathered all at the doctor's door and waited till it opened. The strongest was the first to visit next, regardless of the waiting times of the other patients. However, each physician has a specific number of visits per day, which before could sometimes be exceeded, or the patients had to go home despite the long waiting times if the physician had reached the number of visits on that day. This led to disappointment and oppression for the patients.

> *Since general practitioners were working with handwritten letters for referring patients, stamps, and serial numbers, the idea of digitization was born, because where was the problem? For example, in the polyclinic, a doctor*

> *did not know how many visits he had. Normally, one doctor has a specific number of visits a day depending on his or her specialization. Before, people gathered at the cardiologist, the neurologist, etc. But meanwhile, can a doctor produce more than x visits per day? It created dissatisfaction, nervousness, and all the bad things for patients and doctors.* (Hospital IT, Regional Hospital)

Secondly, it facilitates the work of the physician, as s/he is previously informed about the patients coming and can better plan the working day.

> *Now, the physician knows what visits he has for today or tomorrow. S/he comes in the morning, takes out the number, and knows the names of the patients who are to be visited, as well as by which general practitioner these patients were recommended. So, knowing the names and by which doctors s/he can orient herself/himself much better, and above all, it eliminates the rarity and the grievances* (Hospital IT, Regional Hospital)

Thirdly, as reported by two participants, eReferral increases transparency and reliability and decreases abuses as it is more official and cannot be manipulated as easily as handwritten letters and hand signatures.

> *It is more official and gets into the legal way better, because a hand letter is perhaps a source of other abuses, with a seal, with a hand signature somewhere.* (Hospital IT, Regional Hospital)

In addition, other benefits mentioned, similar to other eHealth tools, were the user-friendliness of the system, the fast technical support and the courses offered for each change in the service, and the fast generation of statistics.

6.3.3 eSickLeave

eSickLeave is also considered beneficial, mainly because it saves time for the patient and the institution. It reduces concerns for the patient regarding the sick leave in case of sickness. In addition, general practitioners benefit from this tool, as they can generate the certificate more quickly than in the past. Moreover, the paper sick leave could be lost more easily. Other benefits of this tool include increased transparency for the insurance industry as well. This service may also eliminate the abuses that were done earlier with the medical report, where some citizens did not appear at work even when they were not sick.

> *The patient does not need to take the sick report on paper and bring it to the institution anymore. It is directly sent to both the institution and the patient.* (General Practitioner, Health Centre)

The sickness reports are sent directly to the employer, the insurance, and the patient, so the patient does not need to give the report on paper to his or her employer or insurance anymore. The sickness certificate appears in the e-Albania profile of the patient under the category "My Documents". Moreover, the employer can search for the sickness certificate through the web interface at https://kontrollo.eraporte.gov.al/ [160] by typing in the ID of the employee and the unique code that the patient has received from the general practitioner. The patient's data and period of incapacity for work appear.

6.3.4 SISP

As aforementioned, SISP was used in some hospitals in order to register patients for billing purposes.

> *Patients are also registered at the reception through SISP, which has more or less the same fields as the paper registration. We have this system; any hospital in Albania can have it.* (Hospital IT, Regional Hospital)

The nurses in tertiary healthcare used SISP mainly for room management, accounting and billing data for inpatient admissions, and typing in clinical information written by hand in a doctor's letter, such as medical history, the diagnosis coded in ICD-9, or the medication given. They can access the system with their individual username and password, where they can access and manage the room data.

> *Each nurse has his or her own username and password. If I select the department's pavilion, I can access the room data. For instance, in room 1, which is empty, it means that there are no sick people. When the patient leaves, I log him out of the system and do the discharge in this folder here. The medical history and diagnosis are handwritten by the doctor, and in this step I must put them in the system. So, I have to ask the physicians in our department which codes the diseases have if a diagnosis does not occur often and I don't already know the code by heart, as each disease has its own code. ICD-9 is installed in our system. Only the head nurse has access to the planning.* (Nurse, University Hospital)

The nurses also record financial data in SISP, which is relevant for control and insurance. The data includes the services and diet the patient has received during her stay in the hospital. The services include laboratory and radiology examinations. In the end, the total expense is automatically calculated by the system.

> *In the dollar sign, we record a lot of data for the patient... Here is the disposal of the diet, the food that the patient receives during the stay in the hospital, where we store the quantity, meals, and date. And this other part is the expense for laboratory examinations. If we get tests from the sick person,*

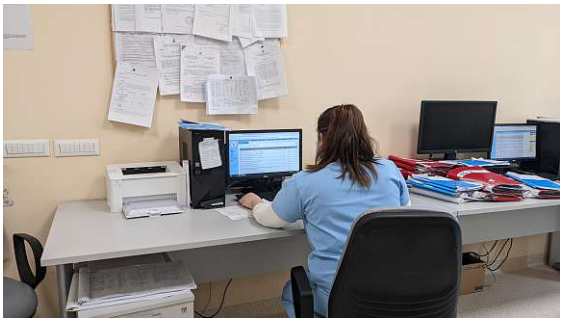

Figure 6.2: A nurse while recording patient information in SISP [Image with permission from G. Hofmann]

> *we put them in this section. I click Add. E.g. complete blood, CRP, etc., and document the quantity. Or if the patient received blood during the stay or plasma, we store the amount given in the system.*
> *In this section, we can add the radiological examinations and their quantities. I can select a head CT or MRI for the brain, write quantity 1, and click Save." The total expense is then calculated automatically by the system. This is the cost to know how much is spent for the hospital, but the patient does not have to pay any money.* (Nurse, University Hospital)

The nurses in tertiary healthcare also store the given medication in SISP.

> *Tomorrow, the next shift documents the given amount of medication. We store the given medication every day in SISP.* (Nurse, University Hospital)

6.3.5 Digitalization in private healthcare facilities

In private facilities, the participants reported being better equipped with the necessary technological infrastructure than in public outpatient facilities. Moreover, the physicians used HIS for accessing and storing the clinical data of their patients recorded in their internal software. The participants from private facilities stated that if the health data is stored electronically, it cannot be easily lost, contrary to paper records, which two Physicians from private hospitals considered advantageous for both clinicians and patients. Some benefits mentioned were that the patients do not need to repeat examinations they have already done, which saves time.

> *Especially in the governmental health system, the data is kept in hard copy. The examinations could often be lost, or sometimes the entire file could be lost, and there were documents that patients no longer had as they submitted their original documents to the hospital, and then all examinations had to be done from scratch.* (Physician, Private Hospital)

In addition, recording the patient's data and having all the examinations of the patient support the clinicians in their decision-making.

> *Regarding the use of such software, it helps us in our work because we have all the patient's data in a file and we have the opportunity to take a look at the examinations, analyses, or anamnesis we have done. This helps us a lot in decision-making.* (Physician, Private Hospital)

6.3.6 Reported Benefits

Multiple benefits of the eHealth solutions used were identified during the interviews. The results entail multiple benefits from the existing eHealth solutions. The most reported benefits of the existing eHealth tools included time savings, improved efficiency, quick access to patient information, enhancement of transparency, reduction of medication errors, generation of statistics, IT support with fast responses, continuous user training courses, and support for decision-making mainly in private facilities.

6.4 Possibilities

Apart from the aforementioned benefits, some opportunities were also reported, mainly from the experts at MSHMS and the IT staff in hospitals. One opportunity for Albanian healthcare consists of preparing eHealth solutions to communicate with other healthcare institutions within the EU. According to the expert from MSHMS the basic service for data exchange with other European countries within the European Health Data Space exists.
Another participant mentioned that the national unification of eHealth services in public facilities enables sharing of information across different HPOs. The same eHealth solutions are deployed among general practitioners, pharmacists, and around 90% of the public hospitals. In Albanian public facilities, there are no historically inherited decentralised programmes, and Albania can learn from other countries best practices.

> *Regarding the hospital part in Albania, I think approximately 90% of the hospitals have identical software and the same structure.* (Hospital IT, Regional Hospital)

Moreover, when asked "What can other countries learn from eHealth in Albania" the expert of MSHMS answered "The record time of implementation of the national eHealth services of 4 years". One benefit could be the centralised organisation of the state, which can enable faster decisions than in the case of a federalized state. Another opportunity for digitalization is that most general practitioners are equipped with the necessary technological infrastructure.

> *There are around 1600 general practitioners in Albania, and all of them are equipped with technological infrastructure, computers, laptops, and Internet access, even in rural areas.* (Expert, Ministry of Health)

However, one general practitioner pointed out that they would need one additional computer for the nurse, as otherwise it is not possible to work simultaneously. One additional computer would save them more time.
The expert of MSHMS stated that it is planned for 2030 that even hospital doctors can complete the health records online, which is also a goal in the Albanian health strategy 2022–2030.

In tertiary healthcare, an implementation of a laboratory ordering system is ongoing, where clinicians can send requests for laboratory analyses for their patients online to the laboratory.

> *Now tertiary healthcare has started to introduce a system, which has not been finished yet, but the only thing is in terms of the laboratory to send the request to the laboratory, but not more than that.* (Physician, University Hospital)

The patients have online access to some of their health documents uploaded in e-Albania, mainly from the general practitioners, including eReferral, ePrescribing, eSickLeave, eCertificate for COVID-19 vaccination, and the tests. When asked how many of their patients have access and use e-Albania, the physicians claimed that most of their patients do use e-Albania for medical purposes. The patient portal was especially needed during COVID-19 for downloading the vaccination certificates, which were an interoperable certificate within the EU called Green Pass. Some of their patients do not have smartphones, but they normally get support from their families.

> *I believe a large percentage of the patients use e-Albania. Some patients who do not have a phone or do not know how to use it mostly get supported by their grandchildren. For example, even now, citizens can download the vaccine certificate (green pass) from e-Albania when they need to travel abroad.* (Physician, Regional Hospital)

In addition, electronic consultations are used between some regional hospitals and the university hospital, mainly for handling diabetes patients. Some hospitals owned teleconsultation centres, where physicians and patients could consult other medical specialists from the university hospital online after arranging an appointment. In these cases, it was not necessary for the patient to travel to the capital city for the consultation.

> *We have history with telemedicine in our hospital. For several years, the hospital has been holding online consultations with the university hospitals in*

the capital city for patients through the teleconsultation centre. An appointment is arranged, and the electronic consultation can be done. Overall, this is of great help because it saves time and saves the patient going all the way to Tirana since they can do the consultation online. Our teleconsultation centre is open from 8:00 a.m. to 4:00 p.m. (Nurse, Regional Hospital)

6.4.1 Reported Possibilities

The main reported possibilities of national eHealth in Albania include the existing basic service for data exchange with other European countries within the European Health Data Space and the centralised organisation of the state, which can lead to faster implementation of the national eHealth solutions. In addition, there are no inherited historically grown decentralised programmes, which allows one to implement the tools from scratch while having the chance to learn from other countries' best practices in this field. The implementation of the national EHR is part of the health strategy, which is planned to be deployed in 2030.

6.5 Issues and Challenges

During the evaluation of the interviews, multiple issues and challenges were identified, which were reported by the participants during the interviews.
Firstly, the most reported concern, mainly among physicians, was the lack of electronic health records in public facilities. The health records still remain handwritten on registers and are collected physically in folders called "kartela mjekësore". A common view amongst hospital doctors was that this is "not contemporary anymore". Some commented on the current state of healthcare digitalization with sentences such as "we are too late" or "we are still far away". Some of the physicians employed in the public hospitals indicated that the private hospitals have progressed regarding the usage of an electronic medical record, while its deployment in the public hospitals is much delayed. The general practitioners also missed the possibility of recording the health records of their patients in the system.

Initially, we have a programme or platform that registers patients electronically, but the cards used to receive patient data, such as diagnosis, histopathology, history, etc., are written by hand. So they are not stored on any computer platform. (Physician, University Hospital)

Some of the participants claimed that the national EHR was implemented a couple years ago, and some of the physicians were prepared to use it. One of the participants reported that at that time a database was created and all kinds of statistics could be generated according to the hierarchy, which was beneficial. However, for unknown reasons, it was left in the middle and not deployed. It is still not in operation in public facilities. Two participants indicated that it may be because of a lack of financial resources, which are needed to maintain and adapt the likely expensive system.

> *About two years ago, they brought us a laptop so that we could start with the online documentation of health records, but we haven't started yet. I don't know why this project stopped with the doctors at the hospital. The system is partly functional for the family doctor, but we, the hospital doctors, have not begun to make it routine yet.* (Specialist Doctor, Regional Hospital)

In public hospitals, the participants stated that electronic communication to other specialties, even in the same facility or within the specialty, is lacking, so the clinicians must physically go to the radiology or laboratory department to receive the results of their patients.

> *If the patient performs a radiological examination (scanner, resonance, or ultrasound), I have to go to the radiology physician myself so that I can get the result of the examination personally from him or her because s/he gives an answer, but the answer is not stored electronically in the system.* (Physician, University Hospital)

The hospital laboratory in public facilities is private and has its own laboratory information system, which, however, cannot be accessed by the medical staff yet.

> *The laboratory hospital, which is private, has its own system that holds the patient's data and the lab results. However, we cannot access it at the moment, and we do not receive information back from them. They simply print out the result, but it is not that they are connected to our system.* (Hospital IT, Regional Hospital)

On the other side, general practitioners can currently generate an eReferral for public laboratories. However, they do not yet receive the laboratory results from the lab online, so the patient must then go and get the results on paper and bring them along to the general practitioner.

One physician claimed that the biggest digitalization achieved in the hospital was the ability to receive the image from the imaging department on his or her own personal number via WhatsApp.

> *Our health system is not digitised at all. They are trying to do something, but we are still far behind. The biggest digitization we have achieved so far is that when I need an image from the imaging department, they can send it to me via WhatsApp on my personal number.* (Physician, University Hospital)

Multiple physicians reported that the private institutions in Albania have advanced more than the public HPOs regarding the usage of electronic health records.

> *I think that the time of digitization has come and gone, that is, in the aspect that we are late at this time, but currently in Albania we are behind, while all the private companies have gone ahead with the issue of digitization.* (Physician, University Hospital)

Secondly, multiple participants, especially physicians in public hospitals, reported the lack of technological infrastructure in their institution.

> *It's not that we have computers in the rooms; we miss them, but in some places we can find a computer of any admin, head nurse, or secretary of the head of service, and these people manage to format this medical data, including the progress of the patient's illness, treatment, and recommendation.* (Physician, University Hospital)

One general practitioner also expressed the wish to have one additional computer so the general practitioner and the nurse can work simultaneously in order to save more time.

> *It would also be good if we had an additional computer, so that the nurse and I could work simultaneously on the computer and save more time.* (General Practitioner, Health Centre)

In the doctor's profile on eReferral, users can also generate a list of his or her patients for that day. However, the specialty doctors rarely used eReferrals. Three participants stated that the problem lay in the lack of computers and the physician's time.

One of the participants recorded the relevant medical information of the patients locally and used an external cloud calendar for managing patient appointments. This information was not shared with other clinicians.

> *I use the computer all the time in my work... I store the relevant patient clinical data in a private calendar, including the date, diagnosis, treatment, or other remarks... I have chosen that calendar, as I have it with me all the time, both at home and at work, and can access it from anywhere. In addition, I create a folder on my local PC for each patient where I store photos of the treatment or other clinical information.* (Physician, University Hospital)

Thirdly, most of the hospital participants from both private and public institutions indicated that the mindset of the clinicians may pose obstacles regarding the implementation of digital solutions in public hospitals. Four participants stated that the old-fashioned mindset may lead to clinician resistance and a lack of collaboration between different specialty doctors or different facilities, including cooperation between private and governmental facilities. According to three participants, the reasons for the resistance

may be the fear of change, or the clinicians may think that it will take longer to type the text on the computer. Thus, the recording process would take more time instead of saving them time. They may also feel monitored, and the strain or working pressure may increase.

> *In my unit, I tried to make a new card, update it, and make a new format like Europe has, but if there is no desire and people or colleagues do not change their minds, it is difficult. You cannot make this change alone because you remain Don Quixote. Otherwise, if these people are added, it would be possible to make the change.* (Physician, University Hospital)

One participant from a private hospital indicated that the mindset of the doctors poses an obstacle to cooperation between the private and public sectors because many doctors only trust their own knowledge. That is why many examinations should be done multiple times by the patients.

> *The mindset of doctors does not allow much cooperation or communication between the private and public sectors. That's why many of the examinations have to be done from scratch.* (Physician, Private Hospital)

Based on previous experience in one hospital, the hospital IT employee claimed that when the electronic prescription was implemented, it was not well received by the doctors in the hospital.

> *When the electronic prescription was implemented, it was not well received by the doctors in our hospital, even by young doctors. Not everyone likes the changes.*(Hospital IT, Regional Hospital)

Furthermore, some participants argued that it is not sufficient to only implement such systems but to motivate and create conditions for their use. Thus, they emphasised the need for governmental policies and regulations. Some participants suggested that the use of eHealth services should be compulsory.

> *The reimbursed prescriptions from the general practitioners are all recorded in the system, but those issued by the hospital doctors are not. Maybe we need a law from the government so that hospital doctors are not allowed to write prescriptions by hand.* (Pharmacist)

Some participants considered the lack of political will as the main issue behind the lack of healthcare digitalization in Albanian public hospitals.

> *In the public facilities, I think the obstacle always remains the political part. If there is a political will, I believe digital health can be realised in Albania too.* (Physician, University Hospital)

On the other side, a minority of the hospital participants did not think that there would be resistance towards digital solutions, as the typing would be done by the doctors, who are young, and not the primary physician, who is mostly old.
Other issues reported multiple times by the participants, who already use the existing national eHealth solutions, were recurring system blockages and downtime. In these cases, the system is not accessible for a couple of hours. In some regions, power interruptions were reported as an obstacle and hazard to using eHealth services. Problems with the internet were mentioned twice.

> *It may happen that there is a blockage, but it happens rarely. In such cases, the system may have a delay of 2 hours. Only when the problem with the hackers happened in e-Albania, the system closed for 2-3 days.* (Pharmacist)

Two of the pharmacists reported that system downtimes mostly happen in particular months when the general practitioners have to update the medication for their chronically ill patients.

> *The system gets sometimes blocked and cannot be used. In the last few years, the blockage happened especially in January because the general practitioners made new prescriptions for the chronic patients at the beginning of the new year and the prescriptions were only valid for two months. (Pharmacist)*

Moreover, multiple participants who use the existing national eHealth solutions reported that the beginning of using the systems was not easy as they contained multiple bugs and issues.

> *In the beginning, we had some difficulties, but now we've gotten the hang of it and the system has been improving.* (General Practitioner, Health Centre)

Another issue being reported was that the private clinics are not part of the healthcare networks, so there is a lack of data exchange between the public and private facilities. Although the clinicians in private hospitals record much medical data electronically, at present the data is not shared with other institutions, impairing the quality and completeness of the data. Thus, the data for national statistics cannot be completed, and the benefit beyond the institution is lower.

> *Of course, for other things like simplifying cooperation with other institutions, this does not work because the information that is documented in the*

> *system is accessed only by us as internal physicians of the hospital. So, they are conveniences that come with our daily work with the patient, but without any benefit beyond that.* (Physician, Private Hospital)

Currently, the physicians in hospitals do not have online access to the medication issued by the general practitioner. When a patient is referred, the current medication is written on paper in the general practitioner's referral letter.

> *The current medication the chronic patients use is listed in the family doctor's letter of recommendation. However, some of the drugs the patient takes, s/he brings while visiting in the red box, because some are reimbursed and some are not. Those that are not reimbursed are not documented in the system; they are personal and must be taken by the patient herself or himself.* (Physician, Regional Hospital)

In cases where the specialist doctor from the governmental hospital prescribes the patient's reimbursed medications, the patient must go to the general practitioner in order to receive an electronic prescription.

The computer usage among nurses in regional hospitals was reported to be rather low, as they had not yet acquired the nurse module of SISP.

> *Nurses do not use computers but document by hand.* (Hospital IT, Regional Hospital)

One participant mentioned that, except for the benefits ePrescribing offers, it does not tolerate even minor medication errors from general practitioners anymore. In such cases, the patients must go back to the general practitioner for a new prescription.

> *However, the manual prescription could accept any small correction, while with the electronic prescription, if the patient comes from a village, we have to send the patient back to the doctor if the prescription is not accurate.* (Pharmacist)

Moreover, another issue reported was the shortage of doctors, which could result in lack of skilled labour.

> *We have a shortage of doctors because most of the medical students who graduate go to pharmaceutical companies, and at the same time, some students study to go to Germany. It is not like before, when the specialisation possibilities for doctors were much more limited.* (General Practitioner, Health Centre)

Regarding the data privacy in the patient portal, it was observed that the opt-out and opt-in options were lacking. This way, the patient cannot decide whether or not he or she is willing to share his or her clinical data with the clinical staff. Moreover, the patient does not have access to the logging protocol, which results in a lack of traceability because the patient does not know who has accessed which data when. In addition, the portal e-Albania does not support multi-factor authentication, which is related to lower security levels. No additional verification is required, as the username and password are required in order to login to the portal.

6.5.1 Reported Issues and Challenges

The most reported issues and challenges of eHealth in Albania include the lack of digitalization of health records, the lack of technological infrastructure, the mindset of the clinicians, which leads to resistance to using technology, system downtimes, and the shortage of doctors. Moreover, one concern was that the private clinics are not part of the healthcare networks, which leads to incomplete health data in the case of national report generation. The lack of eHealth government laws and regulations for enforcing or motivating physicians to use such tools was another issue mentioned by the participants in this study. The professional groups using the eHealth solutions reported several challenges in the initial stages of the adoption of eHealth services. The services have been gradually enhanced, and now the issues with these tools have become scarcer. The participants suggested some steps that could be taken in order to improve the aforementioned concerns regarding the digitalization of Albanian healthcare. They will be described in the next section.

6.6 Ideas for improvement

Regarding the ideas for improvement, five broad themes mentioned by the participants emerged from the analysis of the interviews, which are presented in this section.
Firstly, the most frequently referenced theme during the interviews, mainly by the participants from governmental institutions at all levels of healthcare, was the need for the digitalization of health records.

> *I think the next step to undertake in the digitalization of Albania should be the digitization of the register with the medical records, like in developed countries.* (General Practitioner, Health Centre)

The physicians expressed the need for accessing previous results and the medical history of the patient on the computer so they can make better and faster decisions in treating patients, especially in cases of emergency.

> *It would be good if we started with the digitalization of health records. I also worked abroad, and there it works like this: I have all the previous visits,*

> *the tests, the checks, and the conclusions that have been made for a patient stored in the system. And that would be very good if it were also realised in Albania, because I don't have to ask the patient every time he comes. Plus, when asking the patient, the discussion often goes out of context. Therefore, if I had digital documentation for each patient, it would be easier, even in cases of emergency, because we would know her or his entire medical history. That would be a very good thing.* (Physician, Regional Hospital)

Some clinicians also mentioned that typing the records on the system may take more time, so they would probably visit a lower number of patients per day. However, the benefits would outweigh this disadvantage, as they could have accurate medical information even on the night shift and before the patient arrives at the hospital.

> *For us physicians, there would be more work to be done if we must store the health records electronically, because it means that the visits must be fractionated because typing the medical history for each patient needs its own time. So, it could be that we cannot visit that many times a day, but it would be ideal if I could manage to solve the patient's problem in real time. Moreover, if I am on the night shift and everything is documented in the system, I will know the history of the patient beforehand and how to treat him. I won't need to call so many people. It may be that the patient comes every day to the emergency room, but s/he didn't come when, so there may be delays, as at the moment there are no proper explanations from other physicians who treat the patient. So, if we had a computer programme, it would be something perfect. Moreover, I would see the laboratory analyses directly in the system, and I would not have to go to the laboratory myself to get the answer, etc.* (Physician, Regional Hospital)

The majority of the physicians employed in public hospitals expressed the wish that Albanian healthcare would be digitalized, like in other developed countries. Some of the physicians also had experiences and training in other countries, where they could observe the level of healthcare digitalization and its benefits. So, they would like to have something similar in their institution as well, which could improve the quality of healthcare in Albania. Moreover, four participants reported that digitising the health records would help in research studies.

> *I would want the healthcare in Albania to be digitised. I have also seen hospitals in other countries where we have done training, and I have noticed that, firstly, it is efficient, even in terms of time, despite the fact that the medical staff would have to start typing quickly, but in my opinion, the time has come for everyone to go digital. And inserting a digital card does not only help the professional but also the patient. Moreover, being in an electronic database, I think that this makes it much easier to do studies, to have the possibility*

> *that after a period of time, you can recall such cases as an opportunity to bring out special cases and use these special cases in one secondary case that may be similar to it or may help you perfect the diagnosis for other cases.* (Physician, University Hospital)

Some of the physicians in the university hospital and in regional hospitals considered the entry of electronic health data as the first step needed towards the digitalization of healthcare in a country, which in Albanian public HPOs is still missing. It would be advantageous so that the information could be easily communicated with other colleagues from other departments.

> *The first thing that needs to be done is what is set out to be done to get to the level of digitising the hospital card. It should be opened not only physically but also on the computer, so that every service of the hospital is directly connected, for example, to the emergency room, and every doctor treating the patient should have the information.* (Physician, University Hospital)

The majority of the physicians, including physicians from private hospitals, expressed the need for the electronic exchange of discharge letters and sharing relevant information about their patients with their colleagues from other HPOs.

> *The discharge letter with other hospital doctors, for example, with tertiary hospitals in Tirana, should be exchanged electronically through the system.* (Physician, Regional Hospital)

Moreover, some participants mentioned the benefits and need for cross-border exchange of clinical information since medical tourism is a known phenomenon for Albanian patients, and some of their patients are also treated abroad or consult a foreign physician for a second opinion.

> *I think a unified system is needed, not only in Albania, but it needs to be a unified system all over the world since patients also perform examinations outside the country. Because the unification of all this information for the patient is not only good for us because we have all the examinations that the patient has done, but it is also a collection of very good data, which can then also help with research. However, this does not seem to be something that will happen soon because it is a very big job, especially for the developing countries, which will always be the last to receive these facilities. Thus, it won't be easy.* (Physician, Private Hospital)

Two participants claimed that exchanging health information globally would be beneficial in order to handle the issue of globalisation and rising mobility.

> *eHealth is the highway of a health system. It means that I enter the data of a patient in Albania, and if that patient is, for example, in France, this information that I have in Albania is automatically absorbed. So, if there is an accident in France and the patient is treated there, the doctor there has the history of the visits and all examinations that have occurred in Albania. If this can be realised, it would be one of the best things that can be done for medicine in Albania and globally.* (Hospital IT, Regional Hospital)

Secondly, the stakeholders, especially the pharmacists, expressed the need to enable digital prescriptions for hospital doctors, considering the benefits of ePrescribing and avoiding more medical errors.

> *An electronic prescription has not yet been made for hospital doctors, and this is one of the defects, because an electronic prescription coming from all doctors would greatly solve the problem of doctors' writing, with which we pharmacists make many mistakes.* (Pharmacist)

In addition, some pharmacists expressed the need to include non-reimbursement prescriptions in ePrescribing as well, in order to ensure the benefits of ePrescribing for other prescriptions.

> *However, only the reimbursed prescriptions are electronic; the others are not. So, it would be good if they were also put into the system.* (Pharmacist)

Workflow integration in the hospital system is another point that needs improvement.

> *Workflow integration or the digitalization of the work process should be improved.* (Physician, University Hospital)

There is also a need to enable the possibility of remote patient monitoring, as reported by two participants, so that the clinicians do not need to go to the patient's bed and see the vital signs.

> *It would also be good to monitor the patient's medical parameters from a computer, so that we do not need to go to the patient's bed in order to see them.* (Nurse, Regional Hospital)

In order to achieve the above-mentioned issues and improvements, some participants commented that decision-makers must raise awareness and become more interested in implementing and adopting eHealth solutions. As such, regulations and policies in eHealth from the government are needed. In addition, higher investments could contribute to the improvement of the technological infrastructure, especially in public hospitals, and further development of national eHealth solutions.

> *I think the most important step is the proposal of a strategy in the political structures and the approval of this strategy by the politicians, and I am convinced that with orders from above, the implementation will be done very quickly; it is enough to allocate some funds... Being public will certainly require some political initiative. I have the impression that it has been started several times, but I remember about 10 years ago that this matter was discussed in order to digitalize healthcare, and a foreign company claimed to do this.* (Physician, University Hospital)

The participants indicated that it is necessary to first equip the hospital staff, especially the clinicians, with the required technical infrastructure; otherwise, it is impossible to use the existing national eHealth tools.

> *The eReferral system is built so that the doctors can do the electronic recommendation because the referral is made from the doctor's account. But in terms of infrastructure, not every doctor has a computer and the internet. Thus, it remains the responsibility of the reception. They access the doctor's account and plan for the QSUNT.* (Hospital IT, Regional Hospital)

On the other side, some participants suggested that the clinicians, especially the physicians, should be more open-minded, have a higher acceptance of changes, cooperate more, and have more closeness to each other, as the clinician's mindset for using innovations poses a barrier for deploying such tools.

> *The workflow integration or the digitalization of the work process are things that I have been looking for, but we encountered the obstacle of our colleagues. The mindset is a little backward. So these features are not seen in perspective or in the future. It can be seen up to the tip of the nose. It is not seen any further. It would be good to open the mind and have more cooperation and closeness with each other.* (Physician, University Hospital)

Furthermore, the expert of the Ministry of Health mentioned "technology adoption" and "workflow integration" as the two main concerns of the Ministry of Health regarding digital health. Technology adoption is a suitable instrument for achieving higher acceptance of digital tools among clinicians. In addition, digital health is considered a fundamental goal dedicated to the 2021–2030 health strategy [169].

6.6.1 Reported Ideas for Improvements

For the improvement of the current eHealth state, the stakeholders reported multiple suggestions and approaches.
First of all, the next step that should happen is the digitalization of health records. In addition, some participants emphasised the prospective need for cross-border healthcare

and an international unified EHR because of the increasing trend of medical tourism. They stated that some of their patients sometimes travel abroad for more specialised treatment or a second opinion. Thus, it would be a great benefit for the world to share healthcare information with physicians in other countries. The data collected could enhance health statistics and medical research. Moreover, workflow integration should be improved, and the possibility of remote patient monitoring should be enabled. Regarding e-prescribing, the participants, especially the pharmacists, expressed the need to deploy electronic prescribing in hospital facilities as well. Further, ePrescribing should also contain non-reimbursement prescriptions, considering the benefits of digital prescribing. In addition, political initiatives, regulations, and investments are needed in order to improve the digitalization of Albanian HPOs.

6.7 Summary

This chapter presents and describes the currently used national eHealth solutions among healthcare providers in Albania. The most prominent national eHealth services offered include the central register for patient data, the prescription system, the referral system, the digital signature, and the online sickness certificate. Most of the current national eHealth solutions are used in primary healthcare by general practitioners. However, since a national EHR is missing, the general practitioners still record the medical information handwritten on paper registers, which, as the general practitioners reported, is the only thing not digitalized yet in their sector.

Overall, ePrescribing seems to be one of the most successful and useful eHealth services in Albania. The general practitioners and the participating pharmacists were most satisfied with this eHealth solution compared to other solutions or other professional groups in the governmental facilities. Nevertheless, some of the participants referenced recurring system downtime. In addition, they expressed the insight that the ePrescribing could be expanded to include non-reimbursed drugs as well, in order to achieve higher data completeness and maximise the benefits. Moreover, the hospital doctors shall also start to issue ePrescribing and drop the handwritten prescriptions. The most commonly reported overall advantages relate to time savings and increased satisfaction for both clinicians and patients. Moreover, the eHealth tools contribute to the promotion of transparency, decreases in abuse, and overall increased reliability, and ePrescribing contributes to the reduction of medication errors.

Another benefit consists of the unified eHealth tools for public facilities across the country, which prevents interoperability issues in the governmental sector. The general practitioners and pharmacists were also satisfied with the training on how to use the system. Each change made in the system was communicated, and training (online or on-site) was offered. Furthermore, digital health is considered a fundamental goal in Albania and is dedicated to the 2021–2030 health strategy, which is ongoing. It is planned that in 2030, even hospital doctors can complete the patient card online.

On the other side, the majority of the hospital physicians who participated in this study were not satisfied with the current state of digitalization in their working environments.

The most commonly reported issue related to the low digitalization level in public hospitals. Most of the participants emphasised the lack of digital health records and technological infrastructure in public hospitals. Moreover, some participants suggested that the government regulations on using healthcare services must be enforced, and the physicians' resistance to change is another issue reported when introducing new technologies. "They may fear the change because they may get monitored by the government and their work could be increased", stated one participant. Other challenges mentioned included system downtimes for the existing eHealth services, power interruptions in some regions, a shortage of doctors in the country, and slow internet.

CHAPTER 7

Discussion

This thesis is about trying to explore the current state of eHealth in Albania with a view to investigating the benefits, challenges, and improvement needs of the current state of healthcare digitalization from the perspective of the participating domestic healthcare stakeholders in this study. In this chapter we first give short answers to each of the core research questions and then discuss in more detail.

7.1 Research Questions

In this section we shortly answer the three research questions of this thesis, including the national eHealth solutions which are currently operating in Albania, the comparison of the Albanian approach with that of the four other small European nations, and the reflections of the participants.

7.1.1 RQ1: Which national eHealth solutions are available in Albania?

We determined that over the past ten years, Albania has consistently demonstrated interest in the establishment and development of eHealth services. The governmental sector's most prominent current national eHealth solutions are eReferral, ePrescribing, and eSickLeave. The given medical documents are digitally signed. Additionally, there is a patient portal where patients can view the history of their electronic prescriptions, referrals, or sickness certificates. Some public hospitals are equipped with a telemedicine centre for online consultations. The national electronic health record, which was implemented in the past is currently not operating in Albanian healthcare facilities. For the federal hospitals, an information system called SISP is available [163]. In order to further develop and modernise digital health, the Albanian National Health Strategy 2021–2030 includes five objectives: empowering the patient, modernising the health technology infrastructure, evaluating and using health information for decision-making and key components of

health financing across all funding sources, and improving the capabilities for scientific research [169].

7.1.2 RQ2: How does the Albanian approach compare to the national eHealth strategies of other small European nations?

The strategic decision of the Albanian government to develop the eHealth sector started in 2012 [19]. Denmark began the process of digitalizing healthcare in 1996 [113], followed by Slovenia in 2005 [27], Estonia in 2008 [122], and North Macedonia in 2011 [48]. Thus, Albania started the digitization process last among the other four nations that we reviewed throughout this study.

As in Albania, in the four nations we evaluated for the comparative review, eReferral and ePrescribing were among the most frequently employed eHealth systems. Similar to the four countries, some health data is also available through the governmental portal for the citizens in Albania.

Unlike in Slovenia or Denmark, where the eAppointment module allows patients to schedule appointments directly with healthcare providers [27, 116] Albania does not have this feature in operation. Additionally, in contrast to Estonia, the current Albanian eHealth infrastructure does not mandate radiology facilities to share patient records with other healthcare facilities, does not have a centralised PACS, and does not allow for the sharing of discharge letters between institutions.

In comparison to other countries' experiences, Albania's existing national eHealth services were implemented in a relatively short four-year period. In Slovenia only a small number of the current eHealth solutions could be implemented during the time of the eHealth project, which was co-financed by the EU [27].

The most effective eHealth service in healthcare is ePrescribing, which is similar in Slovenia and Estonia.

In Albania the national electronic record is currently not operating, while in Denmark, Estonia, and Slovenia, the practice of storing health records electronically and exchanging them nationally is widespread. In North Macedonia, attempts to adopt a national electronic health record have been made in the past but were not successful due to poor planning and project management [128]. The Slovenian example has shown that even the most fundamental national ICT solutions require significant work to implement [27].

When asked what the hardest part was in implementing the eHealth solutions in Estonia during an online discussion about eHealth in Estonia, the Chief Medical Officer of Guardtime, Ain Aaviksoo answered that the legal framework and clinicians that are not open for innovations were the most difficult parts and the main blocking point [124]. Therefore, Aaviksoo suggested that it is important to convince users of how they can benefit from the usage of such digital tools and to design user-friendly services in order to also convince less technically ready users to use the eHealth services [124]. This suggestion could be helpful in the case of Albania as well.

Some of the participants in this study suggested that a motivator for achieving higher usage of the currently offered eHealth services in hospitals is the legal act of making the

usage mandatory. The IZIS system in North Macedonia has demonstrated how important strategic eHealth planning is in order to achieve successful eHealth adoption [48].
The barriers lack of electricity and internet connectivity issues were mentioned by some participants in this study and have been technical barriers also in the case of North Macedonia [48]

7.1.3 RQ3: What are the reflections of domestic healthcare stakeholders on the current state of eHealth in Albania?

- Do healthcare professionals use the computer and what for?
  In primary care, the aforementioned existing eHealth solutions have become ubiquitous and well established. Accordingly, computer usage is high in the health centres during patient encounters. The computer usage in public hospitals is limited. Participants from private hospitals reported using the computer more often compared to their colleagues in public hospitals and had a higher level of electronic recording of their health information.

- What are the benefits?
  The existing eHealth tools promise multiple opportunities, while some of the most mentioned advantages of all the existing tools include the improvement of efficiency, promotion of transparency, ease of use, and reducing medication errors. The existing solutions save especially general practitioners, pharmacists, and patients more time, which is important for healthcare providers as they have a shortage of time. Other points of satisfaction reported mainly by general practitioners and pharmacists regarding the existing eHealth tools were the fast technical support, the training, and the communication for each change made to the system.

- What are the possibilities?
  The main reported possibilities of national eHealth in Albania include the existing basic service for data exchange with other European countries within the European Health Data Space and the centralised organisation of the state, which can lead to faster implementation of the national eHealth solutions. Furthermore, the implementation of the first national hospital information model, the expansion of usage of digital health services, and the development of a national system for digital medical images are goals of the National Health Strategy 2021–2030 in Albania [169].

- What are the issues?
  The most reported issues and challenges of eHealth in Albania include the lack of digitalization of health records, the lack of technological infrastructure, the mindset of the clinicians, which leads to resistance to using technology, system downtimes, and the shortage of doctors. Even though eHealth solutions such as eReferral or ePrescribing are available, clinicians access is restricted in hospital settings. The lack of eHealth government laws and regulations for enforcing or motivating

physicians to use such tools was another issue mentioned by the participants in this study. One concern was also that the private clinics are not part of the healthcare networks, which leads to incomplete health data in the case of national report generation.

- What has to be improved?
  The digitization of medical records is the next action that needs to be taken. Additionally, some participants emphasised the potential necessity for international unification of the EHR and cross-border healthcare due to the growing trend of medical tourism. The information gathered could improve medical studies and health statistics as well. Additionally, workflow integration needs to be strengthened, and remote patient monitoring should be made possible. The participants, particularly the pharmacists, underlined the necessity to use electronic prescribing in hospital settings. Considering the advantages of electronic prescribing, ePrescribing should also include non-reimbursement prescriptions. In addition, political initiatives, laws, and financial investments are required to further digitalise the Albanian healthcare.

7.2 Further Discussion

This section provides further interpretation of the findings by focusing on the advantages, possibilities, issues, barriers, and improvements by comparing them with the literature.

7.2.1 Advantages and Possibilities

eReferral was introduced in 2017 in order to enhance doctors work and decrease waiting time for citizens by reducing unnecessary walking and wandering around, which is in line with the reflections of the healthcare stakeholders in this study. The former minister of health stated that this system would also contribute to an increase in people's trust in the health system and enhance the image of the health system [150]. In comparison to other countries' experiences, Albania's existing national eHealth services were implemented in a relatively short four-year period. The centralised organisation of healthcare may have favoured Albania in implementing eHealth services faster than some other countries. Additionally, the lack of inherited information systems in Albanian government organisations may have sped up the implementation of eHealth services.
The availability of the necessary ICT infrastructure, the user-friendliness of the system, the continuous user training, and the IT support were considered some of the facilitators for the technology acceptance in this study, which is in line with other studies [97, 98].
The most effective eHealth service in healthcare is ePrescribing. Electronic prescribing promises significant potential for enhancing the overall quality of healthcare in a country. As indicated in the international review of ePrescribing, launching the ePrescribing service is therefore often a crucial step towards the implementation of national eHealth and an initial component in governmental eHealth strategies [82]. Some advantages of Albania's current eHealth solutions, such as time saving, the reduction of waiting periods, the transparency and efficiency promotion, and medication errors reduction are consistent

with earlier research that investigated the advantages of eHealth solutions [37, 84, 85].
In the governmental portal e-Albania, patients can access some of their medical documents online, which is important for patient engagement. Collaborating with patients is crucial for fostering trust and compliance, which in turn promotes patient engagement and adherence in contemporary treatment, as noted in The Lancet [2]. Therefore, it is essential to provide patients with access to health information and listen to their opinions in order to empower them and improve the quality of care as a whole. In the Albanian National Health Strategy 2021–2030 on digital health, it is planned to further develop the patient portal by providing the medical records of the patients and allowing them to decide themselves which data to share with other healthcare professionals [169].

7.2.2 Issues and Barriers

Yet, this study shows that the state of digital health in Albania leaves room for improvement. In Albanian public healthcare facilities, it is common practice to store health records in the form of handwritten notes. In European healthcare facilities, the digitization of medical records has increased since 2009 and is currently a frequently used practice [55].
This study indicated that the national electronic health record, which was implemented in the past [18, 19] is currently not operating. One of the barriers may be the high costs of maintenance and further development of such a system. In the literature review, we found out that developing nations confront the issue of a lack of funding for healthcare and resources [49]. Furthermore, Fraser et al. [47] noted in their study that the implementation of electronic health records may be a challenge in high-income countries as well. Funding was an issue mentioned in the case of Slovenia as well [131]. In a survey conducted in 2015, 50% of the nations in the WHO European Region stated that lack of finance is the biggest obstacle to establishing national electronic health records [48]. The analysis of the literature contains more instances of 'failed' electronic health record implementations in the healthcare sector [93].
One reason mentioned in this study for the limited access of clinicians in public hospital settings was the physician's resistance, which is also a frequently discussed phenomenon in innovation and may decelerate the adoption process of new technologies in healthcare. Multiple studies have found that innovation and changes in the organisational process, even in modern organisations, may have a problem of acceptance [96]. Large companies may experience increased levels of resistance as the communication channels between management and employees become more indirect and formal [96]. This could explain the fact that innovation resistance is higher in hospital settings, as they are large companies. Shahmoradi et al. [49], who analysed the SWOTs of EHR implementation at Tehran University of Medical Sciences, considered the resistance of the physicians as a fundamental threat, together with the absence of strategic planning.
Moreover, Ruiz et al. [99] found out that healthcare professionals with previous eHealth experience are more open to its implementation. eHealth is a new concept among Albanian governmental physicians, which may be another factor in their lower level of adoption of such services.

Among the Albanian physicians employed in public health, eHealth is an innovation, which could be another reason for the lower acceptance of such services among the physicians in Albania. There are programs aiming to promote health literacy, such as HAP Project [141] and the "PerSHENDETje" campaign. However, further efforts may be needed to decrease the digital divide and educate residents about using digital services, as indicated in Estonia as a learning from the ten years of the eHealth system in Estonia [122]. Increasing patient engagement and enhancing digital literacy are the first stated objectives in the Albanian National Health Strategy 2021–2030 on digital health [169].
Beside the physician's resistance, another barrier consists of the lack of technological infrastructure in the governmental hospital setting in Albania, which is also considered an innovation barrier in healthcare in the literature [97] Moreover, the lack of resources mainly occurs in environments with limited health budgets and limited professionals, as Albania is [49]. Albania has low resources, with a health expenditure of 5,23% of GDP (2018) [14] and 1,6 physicians per 1000 people (2019) [15].
The patient portal may need some further improvements regarding security, such as enabling multi-factor authentication. In addition, Albania could improve the security of the eHealth solutions by using blockchain technology; in that way, they are secured in Estonia.
The private hospitals in Albania are equipped with their own internal HIS systems, whose data can be accessed and recorded by the clinicians within the institution. However, the information recorded in private hospitals is not yet exchanged with other facilities and remains within the institution. Vital Wave Consulting observed in 2009 that the private sector may be neglected as a source for providing health data in the developing world [36], which is particularly important in Albania considering that private healthcare facilities have become popular in the country. In the global survey in 2012, WHO predicted the increasing role of the private sector in patient treatment and recommended that private facilities be part of the healthcare networks in order to be able to exchange information with facilities in the governmental sector and achieve higher levels of data completeness [35]. For this reason, the second specific objective of the National Health Strategy 2021-2030 in Albania aims to create interaction with the private systems [169].
The study also indicated that there is little incentive for sharing data and collaborating between private and public institutions, which was also identified as an issue in the developing world [36].

7.2.3 Improvements

This study suggests that Albania has made progress in implementing national eHealth solutions, particularly in primary healthcare. However, there remains potential for progress in the digitalization of healthcare, particularly in the hospital context. Currently, the biggest issue with Albania's digital healthcare system is the absence of electronic medical records in the governmental sector and the lack of health data exchange across institutions. Patient participation and technology adoption are two other aspects that should be enhanced in order to achieve higher acceptance for using digital health solutions among citizens and healthcare professionals.

CHAPTER 8

Conclusion

"As long as we work together— with both urgency and determination— there are no limits to what we can achieve." (PAUL ALLEN)

This study showed that, although Albania is a country with a low healthcare budget, the digitalization of healthcare in Albania has progressed in recent years. In primary care, the existing eHealth solutions, including eReferral, ePrescribing, and eSickLeave, have become ubiquitous and well established. Thus, computer usage is higher among general practitioners compared to their colleagues at higher healthcare levels in public institutions. ePrescribing and eReferral were introduced in 2017, while eSickReport was introduced in 2022. Some governmental hospitals have already adopted the internal web-based Hospital Information System, called "SISP", which is mainly used for accounting and billing purposes by the hospital admission. Moreover, the patients have partly access to their health data through the national portal e-Albania, including a list of their diseases and a history of referrals and prescriptions. All the eHealth solutions can be accessed online through the web interface, so there is no need to install the software locally.
This study has identified multiple benefits of the existing eHealth solutions. The most reported benefits of the existing eHealth tools included time savings, improved efficiency, quick access to patient information, enhancement of transparency, reduction of medication errors, opportunity to generate statistics, IT support with fast responses, continuous user training courses, and support for decision-making in private facilities.
The main reported possibilities of national eHealth in Albania include the existing basic service for data exchange with other European countries within the European Health Data Space and the centralised organisation of the state, which can lead to faster implementation of the national eHealth solutions. In addition, in the public sector, there are no inherited historically developed decentralised programmes, which allows one to implement the tools from scratch while having the chance to learn from other countries' best practices in this field.
The most reported issues and challenges of eHealth in Albania include the lack of

digitalization of health records, the lack of technological infrastructure, the mindset of the clinicians, which leads to resistance towards technology, the system downtimes, and the shortage of doctors. Moreover, one concern of the participants was that the private clinics are not part of the healthcare networks, which leads to incomplete health data in the case of national report generation.
The participants suggested some steps that could be taken in order to improve the aforementioned concerns regarding the digitalization of Albanian healthcare.
First of all, the next step that should happen is the digitalization of health records, which would contribute to further enhancement of healthcare quality in Albania and facilitate the work of healthcare professionals in an environment with limited healthcare resources. In addition, some participants emphasised the prospective need for cross-border healthcare and an international unified EHR because of the increasing trend of medical tourism. They stated that some of their patients sometimes travel abroad for more specialised treatment or a second opinion. Thus, it would be a great benefit for the world to share healthcare information with physicians in other countries. The data collected could enhance health statistics and medical research as well. Moreover, workflow integration should be improved, and the possibility of remote patient monitoring should be enabled. Regarding ePrescribing the participants, especially the pharmacists, expressed the need to deploy electronic prescribing in hospital facilities as well. Further, ePrescribing should also contain non-reimbursement prescriptions, considering the benefits of digital prescribing. In addition, political initiatives, regulations, and investments are needed in order to improve the digitalization of Albanian healthcare providers.

8.1 Limitations

This thesis can contribute to a better understanding of the current Albanian approach in digitalizing healthcare by describing the eHealth solutions being used among Albanian healthcare providers. The results of the eHealth solutions in the other four nations can contribute to building knowledge about eHealth solutions from other countries and best practices to better understand the Albanian approach. Moreover, the reflection of domestic stakeholders can serve as feedback for national healthcare policymakers by offering suggestions of what could be improved in eHealth or what is currently facilitating the work of healthcare professionals. However, in order to expand the knowledge of eHealth in Albania and investigate future implementations, more studies are needed. Quantity studies may examine more exact rates of eHealth adoption in different healthcare providers and among general practitioners and medical specialists in Albania. Moreover, surveys could uncover satisfaction rates among patients and healthcare professionals regarding the usage of the offered eHealth services in Albania. This thesis used qualitative research methods, which do not allow statistical representation of the results. The comparative review may not represent the current state of eHealth in the analysed countries, as the literature resources about the current state of eHealth in these countries were limited, especially in case of North Macedonia. In addition, more stakeholders could be involved in interviews and surveys in order to receive more responses and provide more representative

generalisations and additional valid information. Vendors and patients could not be recruited for this study due to time constraints. Their point of view and experience are, however, of high importance when evaluating the state of eHealth services in a country.

8.2 Future Work

Albanian vendors and patients could be recruited for future work, in order to also get their point of view and experience about eHealth services offered in the country.
Additionally, the acceptance among physicians could be investigated with technology adoption methods, such as the Technology Acceptance Model, in order to further investigate this issue.
Quantitative data may also be interesting, in order to investigate which institutions are issuing the most eReferrals, ePrescribings, or eSickLeaves. In addition, quantitative data would help to find out how many of the patients use e-Albania in order to access their health information and which service is used the most.
The results of this study can be of interest for comparing experiences with other countries' approaches to establishing national eHealth services and the stakeholder's reflections towards such solutions in order to better identify benefits and issues and learn from other countries' experiences.

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Bibliography

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Appendix A

Interview with healthcare workers in Albania

Demographic Data

- Age:
- Gender:
- Years of Experience:
- Institution:
- City:
- Profession:
- Specialty

Questions

1. Computer environment in healthcare institutions

This section of questions is for:
physicians in primary care & physicians in secondary and tertiary care & nurses & hospital admission & pharmacists

- How often do you use the computer in your job and what for?
- Which data is being electronically stored?
- Which data do you document in paper?
- Would it be possible to show me the software you use on your computer?

2. e-Health - Collaboration with other healthcare institutions

This section of questions is for:
physicians in primary care & physicians in secondary and tertiary care & nurses

- Which patient information do you need from other healthcare institutions?
- How do you access it?
- What works well?
- What does not work well?
- Can you please give a specific recent example to illustrate.
- Do you send any information to other healthcare institutions? If yes, which ones and how?

3. e-Referral

This section of questions is for:
physicians in primary care & nurses & hospital admission

I read that the patients are being referred electronically via the referral system.

- Do you use this system?
- If yes, how?
- If yes, do you see any benefits or difficulties?

4. **e-Prescription**

This section of questions is for:
physicians in primary care & physicians in secondary and tertiary care & IT & pharmacists & PATIENTS??

I read there is also an electronical prescription system, which allows to send prescriptions to a pharmacy electronically.

- Do you use it?
- If yes, which are its benefits or difficulties?

5. **e-Immunization**

This section of questions is for:
physicians in primary care & hospital admission & pharmacists & IT & PATIENTS??

- Is there any electronic immunization system where you can send/see the vaccination status online?
- Which vaccinations can be added/seen?
- If yes, which are its benefits or difficulties?

6. **e-SicknessCertification**

This section of questions is for:
physicians in primary care & physicians in secondary and tertiary care & hospital admission & IT & PATIENTS??

I heard there is an e-SicknessCertification, which allows to send the certification of sickness to the profile of your patient in e-Albania online.

- Do you use it?
- If yes, can you show me how it looks like?
- Are there in your opinion any benefits or difficulties?

7. **e-Health – Patient Participation**

This section of questions is for:
physicians in primary care & physicians in secondary and tertiary care & PATIENTS??

- How do you share the medical results with your patients?
- Do you know whether your patients can access your findings in their personal profile in e-Albanian?
- Have the patients express an interest in accessing data online or do they actively try to access them online?
- If yes, how?

8. Reflections of healthcare employees towards the current state of EHRs in Albania

This section of questions is for:
physicians in primary care & *physicians in secondary and tertiary care* & *hospital admission* & IT

- If the doctor still documents only handwritten in paper: Why is that so?
- Would you like to document digitally? Why / why not?
- How does digitalization and electronic health support your work?
- What are the advantages of electronical health records?
- What are the difficulties of using the computer for documenting the health records?
- What should be improved in your opinion?
- Do you have any other remarks/comments on this topic?

Appendix B

TECHNISCHE UNIVERSITÄT WIEN
Vienna University of Technology

Informed Consent Form for Healthcare Professionals in Albania

Dear Sir or Madame,

You have received this Informed Consent, because you are invited to give a 30 min interview about the healthcare digitalization in Albania.

This Informed Consent Form has two parts:

- **Part 1:** Information Sheet (to share information about the study with you)
- **Part 2:** Certificate of Consent (for signatures if you choose to participate)

Part 1: Information Sheet

I am Greta Hofmann and am studying Medical Informatics at the Technical University in Vienna. This year I am writing my Master Thesis, which aims to investigate the current state of healthcare digitalization in Albania, with the supervision of Univ. Prof. Geraldine Fitzpatrick, PhD.
We are going to give you information and invite you to be part of this research.

Purpose of the research

The study aims to illustrate the current state of eHealth landscape in Albania, to analyse the Strengths, Weaknesses, Opportunities and Threats (SWOTs), as well as to provide reflections of domestic healthcare stakeholders towards the eHealth situation in the country.
The data will be collected by using either on-site or online observations and/or interviews with participants, who are active in different professions, specialties, sectors and cities in different healthcare levels in Albania.
The results will be evaluated with the analytical approach of reflexive thematic analyse.

Participant Selection

You are being invited to take part in an interview, which will last about 30 minutes, because we think that your point of view can contribute much to our understanding about the current state of healthcare digitalization in Albania and provide reflections of what should be improved.

Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not.

Procedures

We are inviting you to take part in this research project.
If you accept, the main topics of the interview will be:

1. Computer environment in your healthcare institution
2. Collaboration with other healthcare institutions
3. The advantages of using technology in your work/healthcare
4. The challenges of using technology in your work/healthcare
5. What could be improved in the digitization of healthcare in Albania

The interview will be guided by myself and will take place either online or on-site according to your preference and the conditions. No one else but myself will be present during this discussion. The interview will be audio recorded and transcribed for further evaluation, if you consent to the recording. Otherwise I will make handwritten notes. The information recorded or noted is confidential, and no one else except myself will have access to the records.

Nothing that you tell will be attributed to you by name.
All evaluations and presentations of results that are published or passed on to third parties are carried out in pseudonymized form. So any information from you will have a number on it instead of your name. Only the researcher will know what your number is.

If you have any questions, you can ask them during the interview or later.
If you wish to ask questions later or have any issues, you may contact me via e-mail: e.greta.hofmann@gmail.com or my supervising Professor: geraldine.fitzpatrick@tuwien.ac.at.

Confidentiality
Personal data processing will be done in accordance with article 13 of GDPR: https://dsgvo-gesetz.de/art-13-dsgvo/.

We will collect some demographic data for statistical purposes, as it allows us to better understand some background characteristics of the digitalization in Albania, for example whether specific sectors or specific specialties do have more access to digitalization than others.
For this purpose following personal data will be collected: Your Age, Your Gender, Your Experience in Years, Your Institution, Your Profession, and Your Specialty.

The list of the demographic data will be safely stored locally in a separate list. Your data will be stored for as long as required by legal retention periods or as required by the purpose.
The only recipients where any demographic data can be transmitted (if necessary) is the advisor of this thesis, Prof. Fitzpatrick or the back-up supervisor.

Right to Refuse or Withdraw
You do not have to take part in this research if you do not wish to do so.
You have the right to withdraw your consent at any time without consequences and without giving reasons.

Legal notice
If you believe that the processing of your data violates data protection law or that your data protection rights have been violated in any other way, you can complain to the competent supervisory authority: Austrian Data Protection Authority (ADPA), Barichgasse 40-42, 1030 Vienna.

Contacts

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Part 2: Certificates of Consent

2.1. Study participation

With my signature I confirm that:

- I have been invited to participate in an interview about healthcare digitalisation in Albania.
- I have read and understood the foregoing information.
- I was informed about the background of the research, names and contact details of the contact persons;
- I have been informed that the consent can be revoked at any time without stating reasons and without consequences
- I consent voluntarily to be a participant in this study.
- If I consent the interview will be audio recorded.

X

Signature of Participant Date

Signature of Researcher Date

2.2. Processing of personal data

With my signature I confirm that I was informed about the:

- Personal data that will be collected
- Period during which the personal data will be stored
- Right to revoke at any time and expiration/consequences of revocation
- Statement that the consent is given on a voluntary basis and that the study participant has been informed about the information rights according to the GDPR

X

Signature of Participant Date

Signature of Researcher Date

Appendix C

TECHNISCHE UNIVERSITÄT WIEN
Vienna University of Technology

Fleta informuese dhe pëlqimi i pjesëmarrjes për punonjësit e shëndetesisë

Përshëndetje,

Ju jeni të ftuar të merrni pjesë në një intervistë 30 min mbi situaten e digjitalizimit në sistemin shëndetësor shqiptar.

Ky dokument përbëhet nga dy pjesë:

Pjesa 1: Fleta informuese (Përmban informacione në lidhje me studimin)

Pjesa 2: Certifikata e pelqimit (Ju lutem firmosni nëse jeni darkord të merrni pjesë në këtë studim)

PJESA 1: FLETA INFORMUESE

Hyrje

Unë jam Greta Hofmann dhe studioj në degën Informatikë Mjekësore në Universitetin Teknik të Vjenës. Tema ime e masterit ka si qëllim investigimin e gjendjes aktuale të shëndetësisë dixhitale në Shqipëri. Mbikëqyrëse e tezës është Prof. Geraldine Fitzpatrick.

Qëllimi i këtij studimi

Studimi ka si qëllim ilustrimin e gjendjes aktuale të dixhitalizimit në institucionet shëndetësore, si dhe të analizojë pikat e saj të forta, dobësitë, mundësitë dhe rreziqet, në bazë të kërkimeve studimore dhe reflektimeve të aktorëve vendas të shendetesisë mbi situatën e shëndetesisë dixhitale në vend. Të dhënat do të mblidhen nga intervistat, si dhe nga disa vëzhgime të proceseve në vend me punonjës të shëndetësisë, të cilët janë aktivë në profesione të ndryshme të sistemin shëndetësor në specialitete, sektorë dhe qytete të ndryshme në Shqipëri.
Rezultatet do të analizohen me qasjen e analizës tematike refleksive.

Selektimi i pjesëmarrësve

Ju jeni i ftuar të merrni pjesë në një intervistë, e cila do të zgjasë rreth 30 minuta, pasi mendojmë se këndvështrimi juaj mund të kontribuojë në kuptimin tonë për gjendjen aktuale të dixhitalizimit të kujdesit shëndetësor në Shqipëri dhe të japë një reflektim të asaj që duhet përmirësuar.

Pjesëmarrja është vullnetare

Pjesemarrja juaj në këtë studim është plotësisht vullnetare. Eshtë zgjedhja juaj nëse doni te merrni pjesë ose jo.

Procedurat

Ne ju ftojmë të merrni pjese në një intervistë.
Nëse pranoni, temat kryesore të intervistës do të jenë:

1. Mjedisi kompjuterik në institucionin tuaj shëndetësor
2. Bashkëpunimi me institucionet shëndetësore
3. Avantazhet e përdorimit të teknologjisë në punën tuaj /qendrat shëndetësore
4. Sfidat e përdorimit të teknologjisë në punën tuaj / qendrat shëndetësore
5. Idetë tuaja për të përmiresuar situaten e shëndetësisë digjitale në Shqipëri

Intervista do te drejtohet nga unë dhe do zhvillohet online ose në vendin tuaj të punës, në bazë të mundësive dhe duke u bazuar në preferencën tuaj. Askush tjetër përvec meje nuk do të jetë prezent gjatë intervistës sonë. Nëse ju jeni dakord, intervista do te rregjistrohet (vetëm audio) dhe do të transkriptohet për evaluim të mëtejshëm.

Nëse nuk jeni dakord që intervista të rregjistrohet, do të më duhet të mbaj shënime gjatë intervistës.

Informacioni që do të rregjistrohet ose të shënohet është konfidencial, prandaj askush përvec meje nuk do të ketë akses në rregjistrimin e intervistës.

Asgjë nga ato që do të më thoni nuk do të atribuohet në emrin tuaj.
Te gjitha rezultatet qe do te publikohen ose te pasohen te te tjeret do të jenë të pseudonimizuara. Pjesëmarrësit e studimit do të identifikohen nga një numër i koduar. Çelësi që lidh numrin në studim me identifikimin tuaj personal do të mbahet konfidencial dhe do të ruhet në një listë separate në kompjuter, ku do të kem qasje vetëm unë.

Nëse keni ndonjë pyetje, mund të ma drejtoni gjatë intervistës ose më vonë.
Nëse keni ndonjë pyetje pas intervistës ose ndonjë problem/cështje në lidhje me intervistën mund të më kontaktoni mua nëpvrmjet adresës së emailit: e.greta.hofmann@gmail.com ose profesoreshën time: geraldine.fitzpatrick@tuwien.ac.at.

Privatësia
Përpunimi i të dhënave personale do të bëhet në akordancë me nenin 13 të rregullores së pergjithshme të të dhënave: https://gdpr-info.eu/art-13-gdpr/.
Ne do të mbledhim disa të dhëna demografike për qëllime statistikore, pasi na lejon të kuptojmë më mirë disa karakteristika të dixhitalizimit shëndetësor në Shqipëri, për shembull nëse sektorë të veçantë ose disiplina mjekesore specifike kanë më shumë akses në dixhitalizim se të tjerët.
Per kete qellim do te dokumentojme te dhënat e meposhtme:
mosha juaj, gjinia, insititucioni, profesioni juaj, vitet e eksperiences ne profesionin tuaj, si dhe disiplina mjekesore.

Lista e të dhënave demografike do të ruhet në mënyrë të sigurt në një listë të veçantë. Të dhënat tuaja do të ruhen për aq kohë sa kërkohet nga periudhat e ruajtjes ligjore ose siç kërkohet nga qëllimi. Marrësi i vetëm ku mund të transmetohet ndonjë e dhënë demografike (nëse është e nevojshme) është mbikëqyrësja e kësaj teze, Prof. Fitzpatrick ose mbikëqyrësi zëvendësues.

E drejta për të refuzuar pjesëmarrjen ose për tu tërhequr
Ju nuk keni pse të merrni pjesë në këtë hulumtim nëse nuk dëshironi.
Ju keni të drejtë të tërhiqni pëlqimin tuaj në çdo kohë pa pasoja dhe pa dhënë arsye.

Njoftim ligjor
Nëse mendoni se përpunimi i të dhënave tuaja shkel ligjin për mbrojtjen e të dhënave ose se të drejtat tuaja për mbrojtjen e të dhënave janë shkelur në ndonjë mënyrë tjetër, mund të ankoheni tek autoriteti mbikëqyrës kompetent: Autoriteti Austriak për Mbrojtjen e të Dhënave (ADPA), Adresa: Barichgasse 40-42, 1030 Vjena.

TECHNISCHE UNIVERSITÄT WIEN
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Autoriteti Austriak për Mbrojtjen e të Dhënave (ADPA):
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PJESA 2: CERTIFIKATA E PELQIMIT

2.1. Pjesëmarrja në studim

Me nënshrimin tim konfirmoj se unë:

☒ Kam lexuar dhe kuptuar informacionin e mësipërm, ku jam informuar për historikun e hulumtimit, emrat dhe detajet e kontaktit, si dhe se miratimi mund të revokohet në çdo kohë pa dhënë arsye dhe pa pasoja

☒ Pranoj vullnetarisht të jem pjesëmarrës në këtë studim

☒ Pranoj që intervista të rregjistrohet

X

Nënshkrimi i Pjesëmarrësit	**Data**

Nënshrimi i Hulumtuesit	**Data**

2.2. Përpunimi i të dhënave personale

Me nënshkrimin tim konfirmoj se unë:

☒ Jam informuar për të dhënat personale që do të mblidhen, periudha gjatë së cilës do të ruhen të dhënat personale, si dhe e drejta e revokimit në çdo kohë

☒ Deklaroj se pëlqimi është dhënë mbi baza vullnetare dhe se pjesëmarrësi në studim është informuar për të drejtat e informacionit sipas rregullores së përgjithshme të të dhënave

X

Nënshkrimi i Pjesëmarrësit	**Data**

Nënshkrimi i Hulumtuesit	**Data**