

STRENGTHENING THE PUBLIC HEALTH SYSTEM IN THE TRANSNISTRIAN REGION AND THE REPUBLIC OF MOLDOVA THROUGH THE PRIZM OF DIGITISATION

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Abstract: *In recent years, the Republic of Moldova has been subject to a series of socio-economic and political challenges. Among the most notable are the Covid-19 pandemic (CoronaVirus 2019), the energy crisis and the political crisis (war in Ukraine). The impact of these crises have radically changed the way of life of the population and influenced the economy, bringing both negative and positive changes. Data were collected from external sources, using qualitative and quantitative method, as well as method of analysis and synthesis, induction, deduction and statistical inference. Comparative analysis was used as a research method in conducting the empirical study. In this article we aim to analyze the positive impact of the Covid-19 pandemic period on the healthcare system, namely: strengthening the public health system through digitalization in the Republic of Moldova and the Transnistrian Moldovan Republic. In order to make a comprehensive analysis of this phenomenon, the indicators that determine the level of development of public health were analysed, namely: the evolution of health expenditure and its share in GDP; life expectancy; medical staff in medical institutions; the degree of sickness and the level of requests for emergency medical assistance. The article presents the digital innovations implemented. Budget execution as an influencing factor was established by analysing the financing of the Semashko and Bismark health systems to expose the degree of flexibility of health service provision in the Republic of Moldova and the Transnistrian region. Thus, following the research, the authors concluded that the consolidation of the public health system through digitization in the Transnistrian region is at an early stage compared to the Republic of Moldova, which is in a stable development. This discrepancy is due to the fact that the Transnistrian region is developing the public health system according to its own scenario and without the involvement of external funding sources. Despite this, digital innovations are developing and are expected to be implemented in the future. Thus, we can observe a much slower development of the implementation of digital innovations to strengthen the health system.*

Keywords: *digitisation, quality of life, development strategy, population well-being, patient-centred hypothesis, health services, electronic register, quality of health services.*

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Introduction

The development of information technologies in recent times has a profound and immediate impact in all areas. The healthcare system is no exception and is being transformed to keep pace with the changes of recent years.

The originality of the research paper lies in strengthening the public health system in the Republic of Moldova and the Transnistrian region through the prism of digitisation.

In the paper is described the level of development of the healthcare system in the Transnistrian region and the Republic of Moldova, and argues the need to integrate the health sector into the European digital space. The prospect of public health transformation will improve the healthcare services offered to the population and will lead to the economic development of the countries in terms of optimising digitisation processes.

The aim of the research is to analyse the level of public health in the Republic of Moldova and the Transnistrian region, as well as the implemented digital technologies. This involves a broad investigation of indicators characterizing the level of public health development, as well as factors influencing public health development. Thus, the focus of this research paper is on strengthening the public healthcare system through digital technologies applied.

The specific objectives to achieve the research goals are:

- To describe the meaning and role of the concept of digitalisation of public healthcare;
- To analyse the digital innovations in medical lifecycle;
- To study the work of international practices in implementing digital innovation in the public health sector;
- Comparative analysis of public health financing systems in the Transnistrian region and the Republic of Moldova;
- To draw conclusions regarding the process of consolidation of the health sector through digitalisation.

Literature review

Globalisation, is seen as a phenomenon of accelerating economic development, is aligned with digital technologies influencing the social, economic, political and public health environment.

Thus, the implementation of digitised health technologies will provide citizens with secure control over access to personal data and give citizens digital tools to empower them to communicate with healthcare professionals and interact with healthcare providers. With the development of information technologies, digitisation, as a concept, can be defined as the process of implementing software-tools and hardware in the healthcare system.

The concept of digitisation of health is a broad term, encompassing many components, including e-health (electronic health), m-health (mobile health) and telemedicine, which encompasses most activities, from electronic patient records, remote monitoring, connected devices, digital therapy and more. This means using information technology, big data, artificial intelligence and machine learning to gather, share, analyse and use patient outcome data to help healthcare workers make cause and operational decisions.

The European Federation of Pharmaceutical Industries and Associations (EFPIA), (Digital Health, 2023) based on European research, proposes a methodology for the use of technology and digital data in the medicine lifecycle (Figure 1).

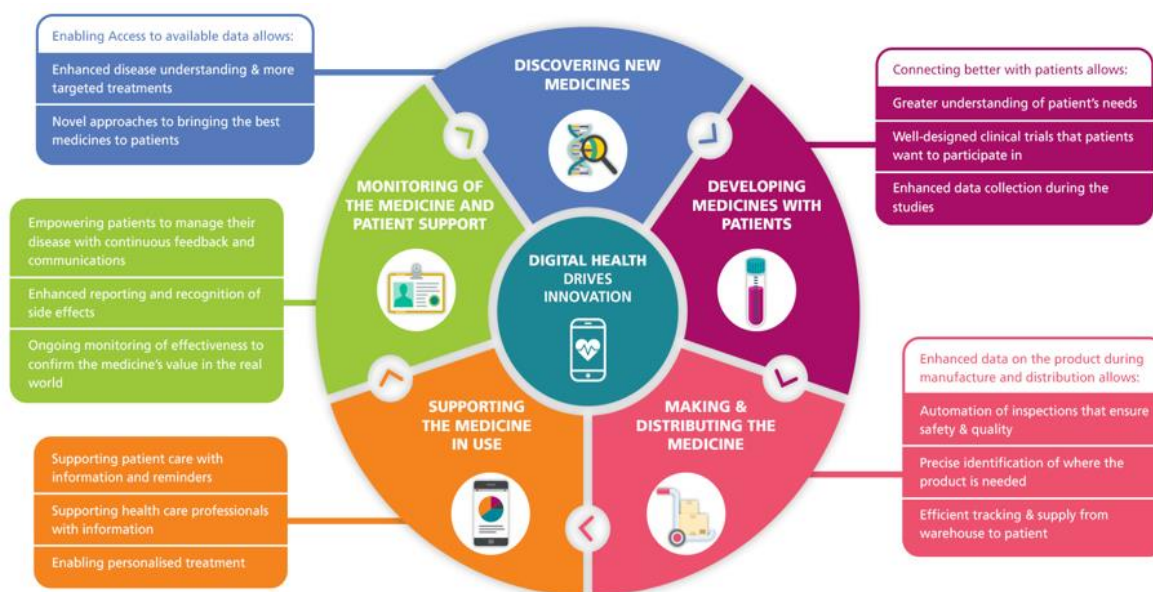


Figure 1. The use of technology and digital data in the medical lifecycle

Source: European Federation of Pharmaceutical Industries and Associations (EFPIA), „Digital Health” 2023-06-27. <https://www.efpia.eu/about-medicines/development-of-medicines/digital-health/>

The authors of the article consider in the future the possibility of homogenizing the medical system in the Transnistrian region and the Republic of Moldova by implementing digitization of medical systems on both sides of the Dniester.

Methodology of the research

The research paper is an intradisciplinary study with some aspects of interdisciplinary research in terms of the impact of Covid-19 and the political crisis (war in Ukraine).

In order to achieve the objectives of the research paper, the authors analyzed data published by the Central Bank and the Ministry of Health of the Transnistrian Moldovan

Republic (Transnistrian region), as well as statistical data from the National Bureau of Statistics of the Republic of Moldova.

The data were collected from external sources using qualitative and quantitative method, as well as the method of analysis and synthesis.

The methods of clustering, induction and statistical inference were also used. Comparative analysis was also used as a research method in conducting the empirical study. Various normative and legislative acts, works of domestic and foreign scientists, as well as other theoretical and practical materials were used as information support of the work.

Analysis and interpretation

The ongoing digital transformation puts the focus on the development of the health economy, which requires consideration of the theoretical underpinnings of the digitisation of people's lives, as well as the use of empirical analysis of changes in quality of life in cross-border regions in different countries.

In order, to make an analysis of the degree of digitisation in the public health environment, the authors propose to track the dynamics over a five-year period of the following indicators:

- Evolution of health expenditure in the Republic of Moldova and the Transnistrian region;
- Life expectancy in the Republic of Moldova versus Transnistrian region;
- Medical staffing of health care institutions in the Republic of Moldova and the Transnistrian region;
- Population morbidity in the Republic of Moldova versus Transnistrian region;
- Requests for emergency medical care served in the Transnistrian region versus the Republic of Moldova.

Thus, in figures 2 and 3 are presented the share of healthcare expenditure in the Republic of Moldova and the Transnistrian region.

We note that the pandemic period (Covid-19) in 2019-2020, has halted the development of the public health sector in both the Republic of Moldova and the Transnistrian region.

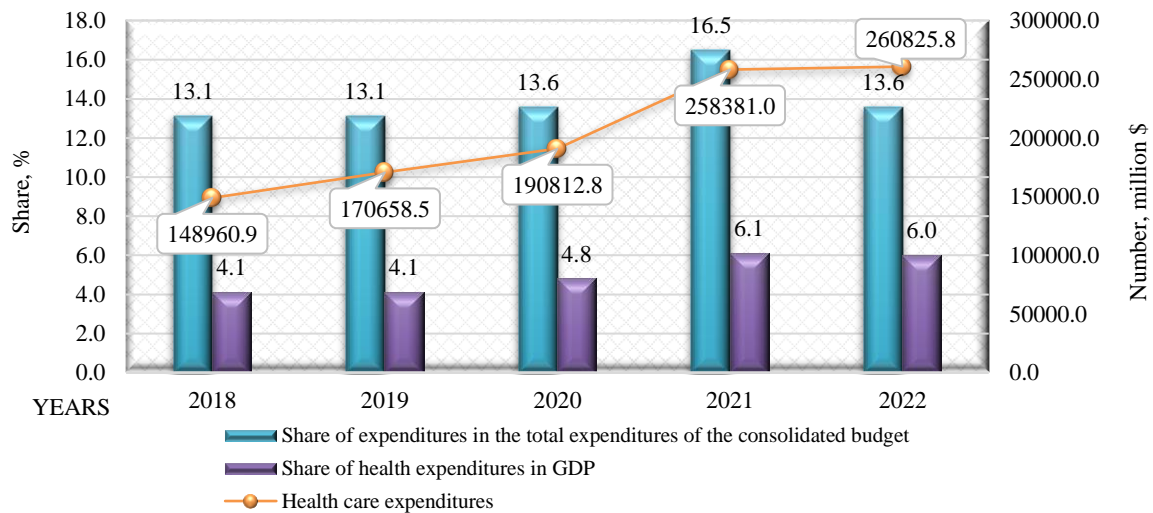


Figure 2. Evolution of the health care expenditure in the Republic of Moldova in 2018-2022

Source: compiled by the authors based on statistical databank of the National Bureau of Statistics of the Republic of Moldova.

The significant increase in the share of health expenditure in GDP by 1.7% in 2021, compared to 2020, shows that this crisis has been managed correctly. The year 2022 shows a decrease in economic growth due to the political crisis in neighbouring countries, namely the war in Ukraine.

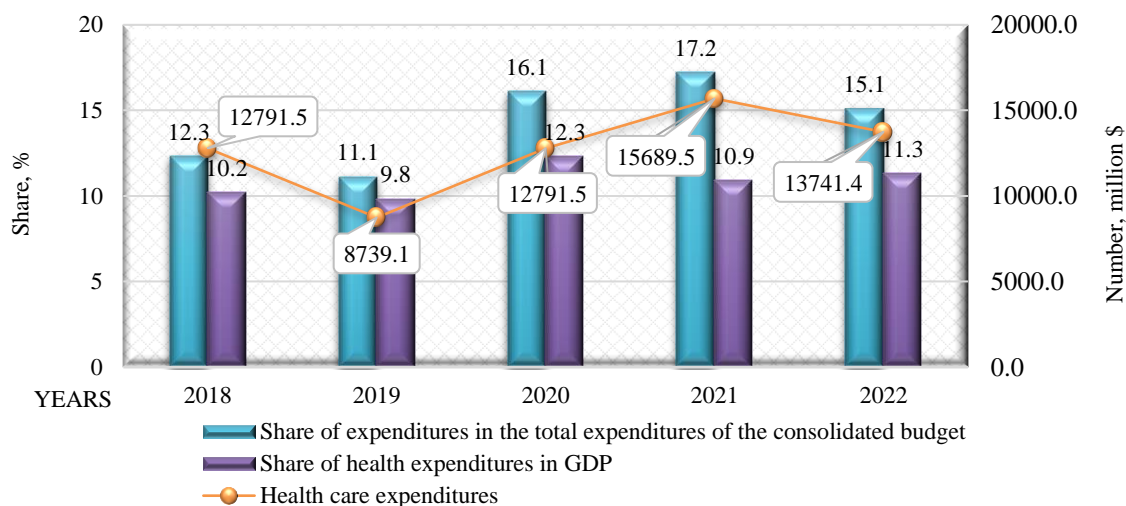


Figure 3. Evolution of the health care expenditure in the Transnistrian region in 2018-2022

Source: compiled by the authors based on statistical data of the Ministry of Health of Transnistrian region

Another indicator analysed in scientific research is life expectancy in the Republic of Moldova versus Transnistrian region, represented in Figure 4. Life expectancy is the number of years a newborn baby will live and depends to a large extent on the socio-economic

development of the country. Thus, the longevity of the population in both the Republic of Moldova and the Transnistrian region is constantly increasing.

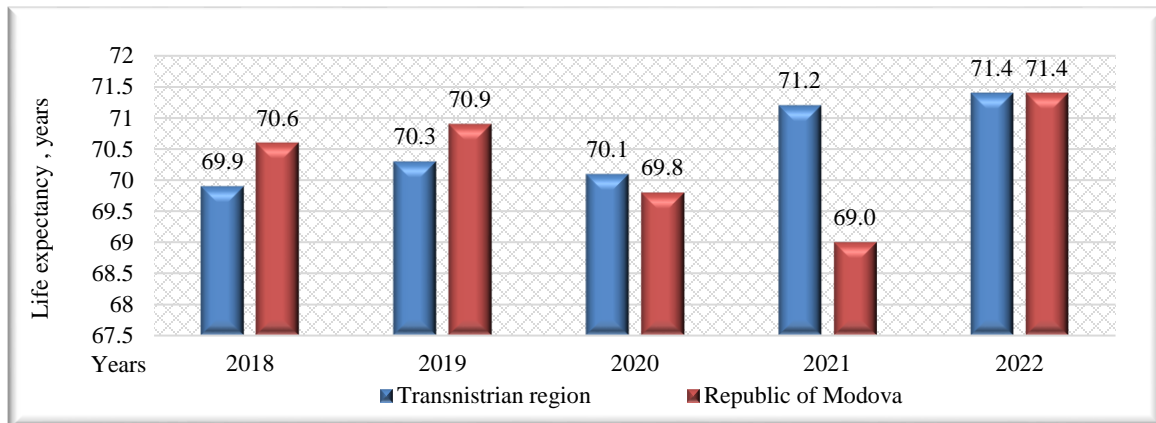


Figure 4. Life expectancy in the Republic of Moldova versus Transnistrian region

Source: compiled by the authors based on statistical data of the Ministry of Health of Transnistrian region and Statistical Yearbook of the Republic of Moldova

The following is an analysis of the medical staffing of medical institutions in the Republic of Moldova versus the Transnistrian region in 2018-2022.

Thus, in Figure 5 it can be observed a steady increase of 5,6% in 2020 at 2018 in the total number of doctors over the last five years in the Republic of Moldova. The number of family doctors and the average number of staff also showed a steady increase.

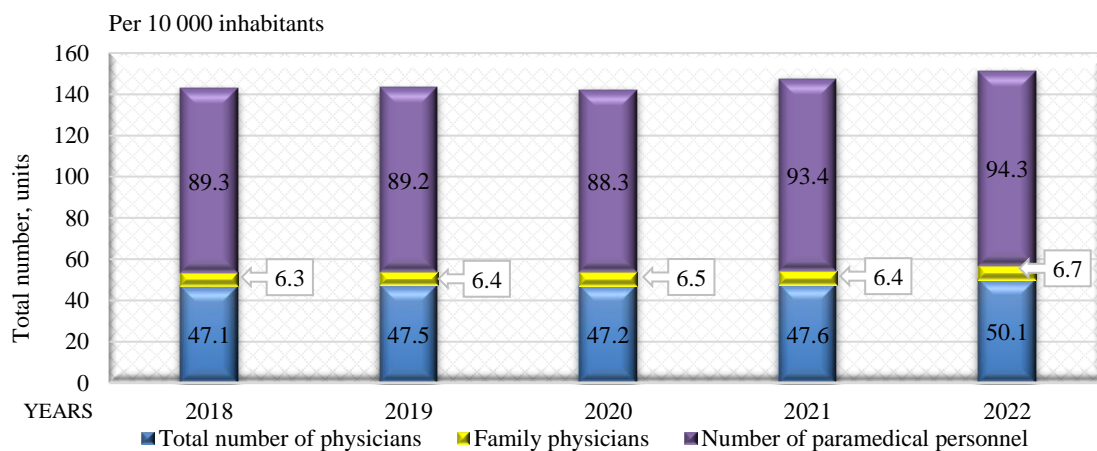


Figure 5. Medical staffing of health care institutions in the Republic of Moldova in 2018-2022

Source: compiled by the authors based on statistical data of the National Bureau of Statistics of the Republic of Moldova

This is due to the implementation of European medical practices in the Republic of Moldova and the addition of qualified staff to provide high quality medical services. The

emergence of private medical centers in the Republic of Moldova is increasing and it is necessary to supplement them with qualified staff as well.

At the same time in the Transnistrian region (figure 6), there is a constant decrease in the total number of doctors, so in 2022 we observe a decrease of 12% compared to 2018. This is due to the process of optimizing the number of doctors in the health sector, which includes the reduction of staff in hospitals. In the Transnistrian region there are also private medical centers offering diagnostic services, treatments and surgical operations as needed.

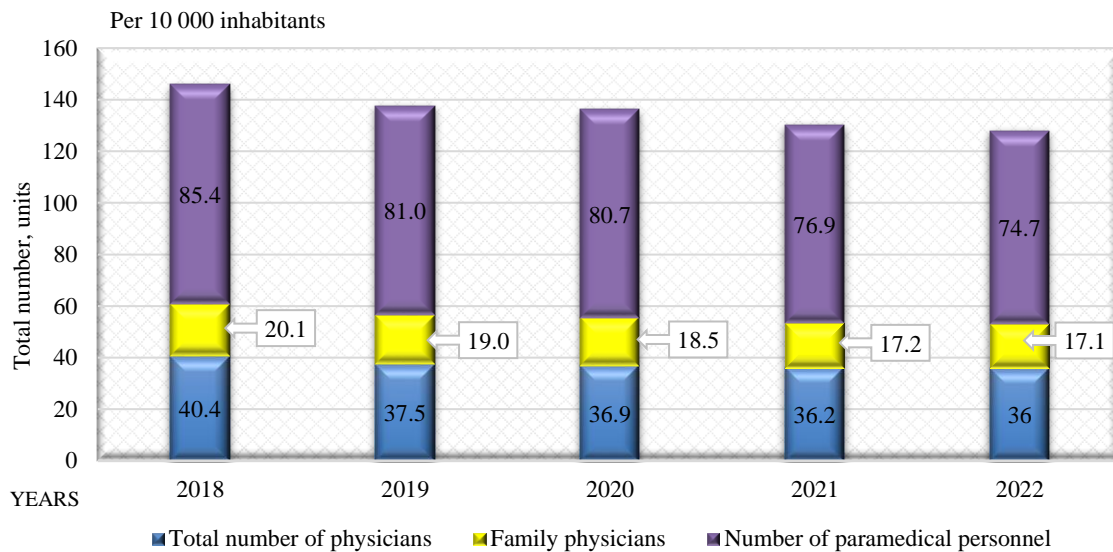


Figure 6. Medical staffing of health care institutions in the Transnistrian region in 2018-2022

Source: compiled by the authors based on statistical data of the Ministry of Health of the Transnistrian Moldovan Republic

Another indicator analyzed in the research paper is the level of illness in the Republic of Moldova versus the Transnistrian region. According to Figure 7, the dynamics of this indicator in the Republic of Moldova is increasing by % in 2022 compared to 2018. The decrease in the year 2020 shows efficient management during the pandemic period and registered a steady increase until the year 2020.

At the same time in the Transnistrian region, this indicator registered a fluctuation in 2019, after which it decreased by % in 2020 compared to 2019 and remained constant until 2020, registering a decrease of % compared to 2018.

Requests for emergency medical, which also serves as an indicator of the level of health and well-being of the population (figure 8). Although this indicator includes not only emergency calls at home, but also emergency calls in case of road accidents, its fluctuations also show the effort made by the state to improve the living conditions of the population.

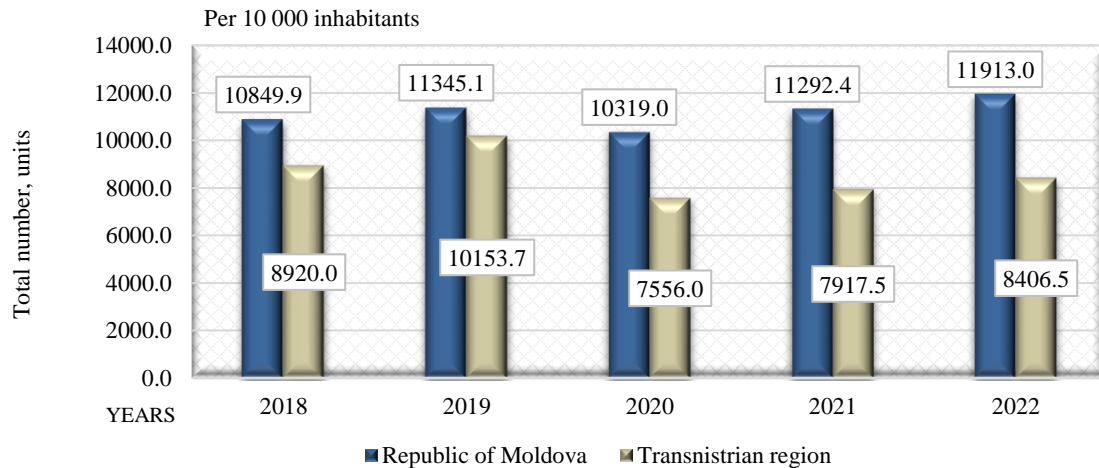


Figure 7. Population morbidity in the Republic of Moldova versus Transnistrian region in 2018-2022

Source: compiled by the authors based on statistical data of the National Agency for Public Health, Ministry of Health

Thus, in the Republic of Moldova this indicator is increasing by about 7% in 2022 compared to 2018, marking a significant increase of 16.9% in 2020 and 21.9% in 2021.

At the same time, in the Transnistrian region, we can observe an insignificant fluctuation in 2019 and a constant decrease since the same year, thus marking a decrease of 2.1% in 2022 compared to 2018. Coronavirus in 2019, which invaded the world, had a more severe impact in the Republic of Moldova than in the Transnistrian region.

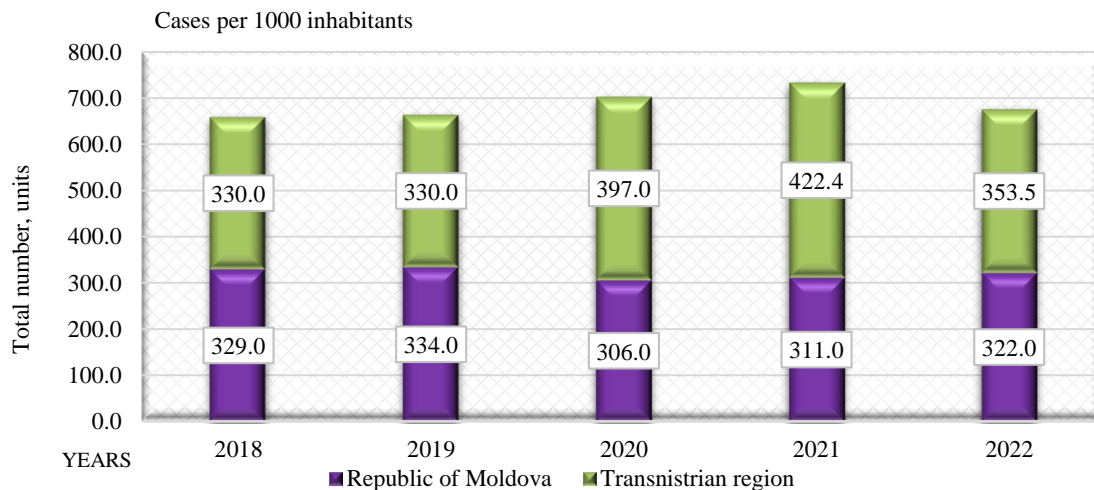


Figure 8. Requests for emergency care in the Republic of Moldova versus Transnistrian region in 2018-2022

Source: compiled by the authors based on statistical data of the Ministry of Health of Transnistrian region

Further, the authors set out to analyze the digital technologies implemented in medicine and the prospects of integrating technological solutions in the field of healthcare in the Republic of Moldova and the Transnistrian region (Table 1).

From the perspective of the country as an example with good digitization practices, both the Republic of Moldova and the Transnistrian region are following the Swiss country-level digitization model.

In the Republic of Moldova, the support of technological innovations to improve the health system is supported both by NGOs (non-governmental organization) funding support and by funding from the country's government. The European and local practices for implementing innovations in medicine were presented at the annual conferences, which aim to accelerate the sustainable development of the digital health system.

At the same time, in the Transnistrian region, in 2022, a "Health Train" pilot project was implemented, which took place in rural areas. A medical team (cardiologist, obstetrician-gynecologist, neurologist, ophthalmologist, and therapist) traveled to the outpatient clinics in the villages, according to the schedule, to cover a larger territory of medical assistance, which is a more effective element in focusing on the lack of specialists in the health sector.

Table 1. Digital technologies implemented in healthcare sector

Country	Republic of Moldova	Transnistrian region
The body responsible for the development of the digitization strategy	The electronic government Agency	Ministry of Digital Development
Country of reference by model	Estonia	Estonia
Pilot projects for digitization of medicine implemented	E-medical system	The health train
	E-sanatate	
Electronic Patient Register	Partially implemented	Partially implemented
Digital Inovations		
Platform	Respiro.md – mental therapy	UE-CFM
	Doctor Chat – redefines access to medical consultations	
Start-up	Baby Medy - real-time clinical temperature monitoring, which smartthermometer devices offer	-
App	Self talk – personal therapist in mental therapy	-
Programs developed in the perspective of implementation	-	Medical mode based on the Atlas program

Source: Developed by the authors based on empirical data

Also, there are various training courses for trainers in Transnistria that retrain staff in "family medicine", organized by the EU-CFM Health Platform team. The event is part of the "Platform in the field of health" project, implemented by the NGO "Association for

health and sport" from Tiraspol, together with the NGO Association of women and children "NOVA" from Chisinau.

In perspective, the implementation of a medical module based on the Atlas program, developed by the Ministry of Internal Affairs of Transnistria, is expected. The implementation of this medical module will record on the electronic platform the patient's transition starting from the request for emergency medical assistance, with the necessary and mandatory tests up to the stage of admission and/or treatment prescription. The program will be implemented first in Tiraspol.

Discussions and findings

Digitisation and healthcare are two major priorities which, when applied to the issue of tackling the effects of the pandemic Covid-19, force us to think about how to create a good resilience structure in the health sector. The authors believe that it is appropriate to introduce international standards in this area, adapt them and work closely with international development partners who are interested and prepared for various future force majeure events in the context of pandemics.

According to the authors, the implementation of the 2025 Health Reform Concept, proposed at the 2019 Medical Forum, is determined by management factors. The introduction of new digitization technologies in medicine manifests itself as an opportunity to benefit and increase work productivity and the quality of medical services..

In terms of efficiency, the authors share the view that the ultimate goal of e-Health is to shift the focus of care from a doctor- and hospital-centered algorithm to a focus group on the patient and the use of digital health technologies. This is reflected in the *Methodology for using digital systems to simplify patient data into a single electronic health record* that can be accessed by different health professionals or for using prescriptions to provide patient mobility for easier access to prescribed drugs, etc.

E-health also means the use of modern technologies, such as artificial intelligence (AI) or Big Data software, to support disease prevention policies by identifying potential anomalies or risks in data and, as a result, adjusting the disease diagnosis. Professor H. Martins, global expert on digital health and WHO expert, states that "the future of healthcare is interdependent with the digitization of processes and provides an insight into the future opportunities as well as the challenges and consequences of realizing the full potential of digital technology in healthcare" (Costru et al. (2022)). Objective indicators that prove the positive changes due to the digitization of processes in the field of health: health status (increased longevity of the population) and the increase in the quality of health services.

The authors of the article point out that Big Data resources are becoming more and more available every day. "Public administration, industry, medicine, retail, social networks,

banking and the Internet of Things - in these and other fields a huge amount of information appears every day. But conventional software is not capable of analyzing this volume of data. that's why machine learning deals with terabytes and zettabytes of information. The new ability to analyze such matrices affects many areas of life, including business, healthcare, communication and entertainment" Kaushan et al. (2022).

The activities necessary to improve the mechanisms and tools for coordination, implementation and evaluation of the national digital development policy must be carried out at several levels.

Budget execution, as a factor of influence, consists of two main operations: hiring and payment. Regarding the commitment of payments to finance the health system (table 2).

Tabelul 1. Comparațiile metodelor de finanțare a sistemelor de sănătate Semashko și Bismark

Country	Transnistrian region	Republic of Moldova
Type of health system	Semashko	Bismark
1.State guarantee program	Partially de facto, (required full)	Completely
2. Insurance	Social	Mandatory
3.Waiting time	Increased	Decreased
4. Co-payments (Contributions)	Installments	Partially
5. Quality and availability of medical services	Low and medium	High

Source: Developed by the authors based on the researched documents

It is suggested by the authors that health care spending should be viewed as an investment, because it contributes to the health of the workforce and supports their ability to work. Medical outcomes more often refer to specific patient outcomes, while social outcomes refer to public health indicators.

In general, it can be said that digitalization in Transnistria is not an exception. The existing health system is at an early stage of digital development. At the same time, this process contributes to the increase in costs for the development of medical care due to the training of personnel, the purchase of new innovative equipment for the introduction of new diagnostic and research methods and, as a result, obtaining an accurate diagnosis and applying the correct treatment methods. The therapy selection algorithm plays an important role in managing disease treatment and improving the quality of health services.

It should be noted that the systematic approach of the current governments regarding the concept of digitization and the coordination of this process is at a high level, which can create "synergies between the programmers of funding research and innovation to support the implementation for all sectors of the economy of local authorities in Transnistria, in the framework of the smart specialization approach, where NGOs are operators of innovative public-private partnerships of digital projects expected by society" PÉREZ & al. (2014).

Conclusions

Thanks to IT tools, the negative economic and social impact of the pandemic has been mitigated, allowing a relative stability and economic sustainability of health services, which will allow a transformation towards the development of a sustainable economic performance in the field of health, which will lead to a better quality of life in the future. The disproportion of medical assistance in urban and rural areas is greatly increased, a fact that requires a very serious approach and as close as possible to the patient. The pilot projects implemented both in the Republic of Moldova and in the Transnistrian region represent opportunities in the development of medical digital platforms/modules that would cover the population's need to receive qualified medical assistance. At the same time, the gaps are identified and taken into account in the future in the development of the strategic plan for the development of the medical system at the national level.

As a benefit, the information technologies applied in the medical sector have highlighted the patient-centered hypothesis. After conducting the research study, the authors found that in the Transnistrian region the main situation of stagnation in the implementation of digital technologies is recorded the distribution of contributions and the long time needed for the implementation of new innovative technologies. Optimization in the medical sector also represents a factor of stagnation in the development and strengthening of the health system. The financial sources distributed for the health system are insufficient and the process of implementing innovations takes place more slowly than in the Republic of Moldova. Attracting foreign investments would partially solve the stagnation problem, because despite the fact that Transnistria has an uninsured medical model, and the possibilities in cases of complicated interventions are lacking, the government allocates financial resources annually for people who require interventions with a high degree of complexity abroad. However, the authors express their opinion regarding the consolidation of the public health system through the prism of digitalization in the Transnistrian region as an option that requires experience and will take place over time. In the context of implementing the new elements of digitisation, new thinking is required from all actors and partnerships in the health system.

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