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EXPERIENCE WITH ELECTRONIC REGISTERS IN ANALYZING DEMOGRAPHIC PROCESSES IN UKRAINE

Introduction. *The availability of electronic register systems has significantly improved access to aggregated information on the resident population, facilitating more accurate and efficient calculations of demographic indicators such as population size, age-sex structure, mortality, birth rates, and life expectancy. These calculations have become especially critical during and after periods of armed conflict.*

Problem Statement. *Ukraine has initiated the development of a national system of public electronic registers; however, many essential components have not yet been implemented. Existing registers often lack the necessary structural design and are not fully populated with relevant data. Moreover, the absence of standardized unique identifiers has hindered the interoperability of information across different registers.*

Purpose. *This study aims to summarize Ukraine's experience in developing electronic registers for demographic analysis and to formulate recommendations for the introduction of new registers and the implementation of unique identifiers to enhance data integration.*

Materials and Methods. *The research has applied methods of systems analysis, scientific generalization, comparative analysis, and complex systems study.*

Results. *The analysis of currently available electronic information systems in Ukraine has enabled the identification of a set of registers suitable for demographic research. The study has proposed the introduction of additional resources and a unified system of identification keys to enhance the future structure of electronic registers. Recommendations have been developed for the design of registers explicitly intended for statistical purposes.*

Conclusions. *To establish a comprehensive and functional system of public electronic registers, it is essential to conduct a full audit of existing systems, modernize and restructure outdated or insufficiently developed resources, and create new registers in key areas of public administration. It is also necessary to update existing data, implement standardized identification keys, and ensure interoperability across registers. The majority of current electronic registers require significant upgrading and further development.*

Keywords: system of electronic registers, demographic processes, population registers.

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Electronic registers (ERs) and databases (DB) during the period of their introduction in developed countries have already accumulated significant amount of information, without which it is difficult to imagine research in the field of demography. It can be stated that in the recent 5–10 years, Ukraine has also taken significant steps towards digitalization of the state, and some Ukrainian ERs were created as early as the last century.

Electronic registers provide a great advantage both to authorities of various levels for making management decisions, and to scientists for thorough research, especially related to demographic processes, due to:

- ◆ arranging a large amount of information accumulated in various departments and organizations;
- ◆ accelerating the provision of various services, including state services;
- ◆ reducing bureaucracy and the number of appeals of the country's residents to state bodies;
- ◆ compiling statistics of various industries;
- ◆ performing demographic calculations;
- ◆ conducting population, housing, agricultural, etc. censuses.

The main feature of the register is that each unit in it can be uniquely identified, which is usually done with the help of identification codes (keys). This key is used to bind other attributes of the unit which characterize its certain qualities, depending on the purpose of creating the registry.

It is impossible to govern a country without having information about its population by age and sex, distribution across the territory, mortality, birth rate, and internal and external migration. More to it, such large, costly events as the population and housing census in developed countries are also conducted with the involvement of ERs, which provide the state with part of the necessary information without surveys and with a significant reduction in expenses. However, the state shall have not only high-quality ERs, in which data are constantly being updated, but also a full-fledged system of electronic information resources of all spheres of human activity, i.e., the system in its

classical sense as a set of interconnected resources forming a single whole. In order to create such a system, it is necessary to have not only well-planned and filled with high-quality information registers and databases of various fields, but also keys by which these elements of the system can be connected. Such keys are usually three types of identification numbers: natural persons, addresses, enterprises (institutions, establishments, organizations). As the experience of many European countries has shown, these are the keys that make it possible to connect all the necessary information of electronic registers and databases for the state governance into a complete system.

As emphasized in the documents of international organizations, any state system of registers should be divided into basic and specialized ERs [1]. From the name itself, it is clear that the former create a basic set of natural persons, housing stock and enterprises and organizations (e.g., registers of population, housing or enterprises), while a specialized ER is created for some specific purposes by the body holding this register, which is usually the main user of information (e.g., tax, educational, pension, military registers, etc.).

Of course, we should not forget about the private sector ERs, such as those operating in the banking sector, but they cannot always be included in the state system of electronic resources.

EU governing bodies pay much attention to the development of a common digital infrastructure. Thus, on October 2, 2018, the European Parliament and the Council of the European Union adopted a resolution on the creation of a single digital gateway (Regulation (EU) 2018/1724 of the European Parliament and of the Council) [2], which will facilitate the free movement of goods, services, capital and people. This regulation is constantly being improved and supplemented. The last amendments were made on May 23, 2024.

The COVID-19 pandemic has made adjustments to EU programs and plans: the digital COVID certificate, created in accordance with EU Regulation (Regulation (EU) 2021/953), which entered into force on July 1, 2021 and covered vaccination

against COVID-19, testing and recovery, facilitated safe travel for citizens, and was key to supporting Europe's hard-hit tourism industry. In the period before its cancellation on June 30, 2023, 51 countries on four continents were using this system. In total, more than 2.3 billion certificates were issued [3].

Another example of the creation of a common European digital space is the Business Registers Interconnection System (BRIS) of the member states based on "the European Central Platform". It was created on the basis of Directive 2012/17/EU and implemented on June 8, 2017 [4].

Thus, plans for Europe's "digital decade" are being actively implemented. As stated on the European Commission's website, Europe shall strengthen its digital sovereignty and set standards now, rather than follow the standards of others, it should focus clearly on data, technology and infrastructure [5].

On the way to the European Union, Ukraine should follow the European policy, developing and implementing new electronic registers and creating a powerful digital infrastructure that would cover various spheres of the society's functioning. And some successes are already being recorded even in the difficult military realities of Ukraine.

SYSTEMS OF REGISTERS IN NORTHERN EUROPEAN COUNTRIES

The countries that have created the most developed register systems are considered to be the Northern European countries: Norway, Denmark, Sweden, Finland, the Netherlands, and Iceland [1]. But, in our opinion, this cohort should also include Estonia, which in a relatively short period of time has created a full-fledged e-government system based on electronic registers and has been granted the right to host the headquarters of the EU IT agency. All these countries have the same basic registers as defined by the UN [1]:

- ◆ register of natural persons (population register),
- ◆ real estate register (real estate, buildings and residential premises),
- ◆ register of enterprises.

The population register (usually it is called the Central Population Register — CPR) contains basic information about all persons living in the country: sex, age, military obligation, nationality, etc. It also usually includes links to parents and spouses, making it possible to create a family unit.

From the point of view of studying demographic processes, it is also important to have, first of all, the information from the healthcare, pension, social, and migration registers. It should be noted that all Northern European countries have almost identical register systems, though the number and structure of the ERs in some fields may differ. Table 1 summarizes the information on certain ERs in these countries and Ukraine, that should be used to monitor demographic processes. As it can be seen from the table, the first 5 groups of registers are available in all countries: population, addresses, pension, social services and healthcare, and all of them have registers of education. At the same time, the address register containing information on housing and buildings does not exist separately, but is a part of the population information system in Finland, while in Norway and Denmark this data is included in the same information system as real estate and addresses. The number of registers in the healthcare and education sectors also varies by country. The absence of such medical registers as births and causes of death in the health information system of the Netherlands is explained by the more extensive CPR, which contains the relevant information. In Ukraine, deaths, both due to illness and other causes, are registered in the State Register of Civil Status Acts, which is held by the Ministry of Justice. Among other information about the deceased, the Register contains information about the cause of death, for which the code of the Classification of Diseases and Related Health Problems is selected. So far, no data on the existence or absence of medical registers of births and deaths in Ukraine have been found. As for the registration of migration processes, Denmark and Finland, according to our information, also place this information in the relevant sub-registers of the population registers. Other countries have created specialized ERs.

Table 1. Registers in Northern European Countries and Ukraine for Studying Demographic Processes

No.	Registers	Denmark	Sweden	Finland	Norway	Netherlands	Estonia	Ukraine
1	Population	+	+	+	+	+	+	+
2	Addresses (houses, dwelling)	+	+	-	+	+	+	-
3	Pension	+	+	+	+	+	+	+
4	Social services	+	+	+	+	+	+	+
5	Healthcare	+	+	+	+	+	+	+
6	Births (medical)	+	+	+	+	-	+	n.a.
7	Causes of deaths (medical)	+	+	+	+	-	+	n.a.
8	Education	+	+	+	+	+	+	+
9	Migration	-	+	-	+	+	+	+

Note: n.a. — no information available.

Sources: compiled by the authors based on information from [6, 7].

In our opinion, Denmark, Norway and Estonia are the most advanced countries in terms of creating register systems among the above-mentioned countries. In these countries systems of registers have been created which can best provide information to both state administration and local self-government bodies, as well as to the population of the country due to a certain branching and involvement of all major spheres and types of activities.

STATE OF REGISTERS IN UKRAINE: CREATION AND DEVELOPMENT

Despite the many efforts made by the authorities of our country in recent years in order to create a full-fledged system of public electronic registers (PER), it is not yet possible to state that this process is close to completion. In our opinion, until recently it was not carried out systematically, but rather haphazardly. Each executive body created its own information and communication system with its own registers / databases at different times

(see Table 2), without worrying about how well it can work together with the systems of other branches of government, whether it is possible to connect their ERs with keys, or whether it is possible to collect all the necessary information about a certain unit (e.g., a natural or legal person) from registers / databases without directly contacting this unit for the necessary documents and certificates. Also, the single identifier of a natural person was not introduced (and now it is one of the main obstacles to creating a system of electronic registers).

The Unified State Demographic Register (USDR), which was introduced at the time, contains a unique entry number in the register (UENR), which could identify every resident of the country, but the register is still in the stage of filling, considering that not all persons applied in the last 10 years to the holder of the register, the State Migration Service of Ukraine (SMSU), for the new documents with contactless electronic media (passport of a citizen of Ukraine, national passport for traveling abroad, seaman’s passport, etc.), and information from old documents is being gradually step by step transferred to USDR. Registers of territorial communities (RTC) do not function in all communities, taking into account the fact that local authorities are not always technologically able to create and implement their electronic register, and in addition to it, part of the territory of Ukraine has been temporarily occupied since 2014. Although it is RTC that should be the provider of information about the residents of the community who have registered or declared their place of residency (staying) in it [8], to the USDR.

The State Tax Service of Ukraine has introduces its own identifier for natural persons in the State Register for Natural Persons-Taxpayers (Registering Number of Taxpayer Record Card – RNTPRC or Taxpayer Identification Number – TIN). However, not all residents of the country have paid taxes and received RNTPRC (e.g., persons who have never worked, minor children, foreigners who do not work but reside in Ukraine), and there is a category of persons who refused to receive

Table 2. Main Electronic Registers of Ukraine, Containing Information on the Population

No.	Name	Holder	Creation date	Notes
1	Unified State Demographic Register (basic)	State Migration Service of Ukraine	2012	
2	Registers of Territorial Communities	Registration authorities for executive bodies of village, town or city councils	Since 2016	By now they have been created not in all territorial communities
3	State Register of Voters	Central Election Commission	2009	Information about voters has been entered since 2006
4	Electronic Healthcare System eHealth. The system includes:	Ministry of Health of Ukraine, National Health Service of Ukraine	2017	It consists of the Central Database and Electronic Medical Information Systems
	Register of patients	National Health Service of Ukraine	2017	
	Register of patients in need of insulin therapy	Ministry of Health of Ukraine	2016	
	Register of declarations on the choice of a doctor who provides primary medical care	National Health Service of Ukraine	2018	
5	State register of Ukraine of persons affected by the Chernobyl disaster	Ministry of Health of Ukraine	1997	
6	National Cancer Register	National Cancer Institute	1989	
7	The Unified Social Sector Information System (based on the Unified Social Register), previously maintained separately:	Ministry of Social Policy of Ukraine	2021	The draft law on the Unified Social Register was rejected and withdrawn from consideration (February, 2024)
	Register of Internally Displaced persons		2014	
	Unified state register of recipients of housing subsidies		2018	
	Unified state automated register of persons entitled to benefits		2003	
8	Unified information and analytical system of the State Employment Service	State Employment Service	2012	Until 1999 there was a Database of job seekers and registered unemployed
9	Register of Insured Persons of the State Register of Compulsory State Social Insurance	Pension Fund of Ukraine	2011	
10	Register of victims of industrial accidents and occupational diseases	Pension Fund of Ukraine	2002	Until January 1, 2023 it was held by the Social Insurance Fund
11	Electronic register of sick leave certificates	Pension Fund of Ukraine	2020	
12	Unified State Register of war veterans	Ministry of Veterans Affairs of Ukraine	2021	
13	Register of institutions providing psychological assistance services for veterans and their family members	Ministry of Veterans Affairs of Ukraine	2022	Transformed in 2023 from the Register of providers of psychological rehabilitation services for veterans and their families

No.	Name	Holder	Creation date	Notes
14	State Register of natural persons – taxpayers	State Tax Service of Ukraine	1996	
15	The Unified State Electronic Database for Education. In particular, the database includes: Register of educational documents Register of teaching and research staff	Ministry of Education and Science of Ukraine	2011 2020 2022	
16	Unified register of debtors	Ministry of Justice of Ukraine	2016	
17	State Register of Civil Status Acts of Citizens	Ministry of Justice of Ukraine	2008	
18	State Register of Proprietary Rights to immovable property (basic)	Ministry of Justice of Ukraine	2013	
19	Unified State Register of legal persons, natural persons-entrepreneurs and public organizations (basic)	Ministry of Justice of Ukraine	2004	
20	Inheritance register	Ministry of Justice of Ukraine	2000	
21	Unified State Register of declarations of persons authorised to perform state or local self-government functions	National Agency on Corruption Prevention	2016	
22	Unified State Register of persons who have committed corruption or corruption-related offences	National Agency on Corruption Prevention	2012	Until February, 2019 the Ministry of Justice of Ukraine was the holder of it
23	Unified State Register of Vehicles (basic).	Ministry of Internal Affairs of Ukraine	2018	
24	Unified State Register of conscripts, persons liable for military service and reservists “Oberig”	Ministry of Defence of Ukraine	2021	In 2017–2021, the Unified State Register of Persons Liable for Military Service was in operation
25	State Land Cadastre (basic)	State Service of Ukraine for Geodesy, Cartography and Cadastre	2013	
26	Integrated interdepartmental information and telecommunication system for the control of persons, vehicles and cargo crossing the state border (ITS “Arkan”)	State Border Guard Service of Ukraine	2008	

Sources: [7, 9, 10].

RNTPRC due to religious beliefs. Thus, neither the UENR nor the RNTPRC can yet serve as a single identifier for all registers containing information on the population.

Regarding legal persons (entities), the situation is much better: each of them has a code of

EDRPOU (Unified State Register of Enterprises and Organizations of Ukraine), which is issued by statistical authorities for registration of legal persons in the Unified State Register of Legal Persons, Natural Persons-Entrepreneurs, and Public Organizations.

The third identifier is usually used when building ER systems. It is the address identifier that needs to be introduced in accordance with the relevant decisions [11, para. 26] as part of the establishing in 2024–2025 of the Unified State Electronic System in the field of construction, which should include a Unified State Register of Addresses, a Unified State Register of Administrative Territorial Units and Territories of the Territorial Communities, a Register of Buildings and Structures.

This means that it is still impossible to create a full-fledged system of PERs in Ukraine in the absence of a single identifier of natural persons and a digital code (identifier) of addresses.

However, it should be mentioned that a number of legislative acts have been adopted in recent years that will facilitate further development of the electronic register system. Prior to the large-scale invasion, the Law of Ukraine “On Public Electronic Registers” [12] was adopted, which formulated the concepts of “system of electronic registers” and “public electronic register” and in which the basic registers of the future system were defined. Unlike most Northern European countries, Ukraine has specified a much larger number of ERs as basic ones [12, Art. 6]:

- 1) The Unified State Demographic Register;
- 2) The Unified State Register of Legal Persons, Natural Persons-Entrepreneurs and Public Organizations;
- 3) State Land Cadastre;
- 4) Unified State Register of Vehicles;
- 5) Register of Buildings and Structures;
- 6) Unified State Register of Addresses;
- 7) State Register of Proprietary Rights to Immoveable Property.

Besides the basic ones, the ER system includes the so-called other registers (the holders of which are state authorities, local self-governments, legal persons of public law, etc.) and registers of self-regulatory organizations (e.g., public organizations and societies).

And the system of registers is defined as one that contains a set of registers which function and

interact to create, store, process and use information in the course of licensing activities, provision of administrative, social and other public services, other management activities and state regulation [12, Art. 6].

Also in 2023, another step was taken to define the interaction between the USDR and the registers of other systems, specifically, the Electronic Healthcare System (EHS), the Unified Social Register (USR), which is an integral part of the Unified Social Sector Information System (USSIS), and the State Register of Compulsory State Social Insurance. Along with other information on natural persons, the USDR should now also transmit the person’s UENR [13], which will greatly simplify the search for information in these registers.

The electronic healthcare system of Ukraine was created relatively recently (see Table 2), but it quickly began to be filled with information. And while in 2020, the Central Database (CDB) of the system contained less than two dozen ERs [7], currently there are 45 of them [14]. The list of the registers is not yet available, so it cannot be stated that over the past three years, no electronic registers similar to those in Northern European countries have been connected to the Central Database, but both the recent COVID-19 pandemic and the war have had a significant impact on the strategy of the system. In a number of our publications (see, for example, [15]), we proposed to add new registers to the CDB, similar to the structure of the systems in European countries (they are: the Register of Drug Addicted Patients, the Drug Treatment Register, the Register of Twins, the Cardiovascular Disease Register, Antibiotic Use and Related Infections Surveillance Register, Antiviral Drug Resistance Surveillance Register, Immunization Register, Hospital Utilization (Occupancy) Register, Infectious Disease Surveillance Register). It is already known that the EHS has implemented an electronic integrated disease surveillance system that registers information on infectious diseases [14]. In our opinion, it was due to the need of registering information on the incidence of COVID-19, which had become

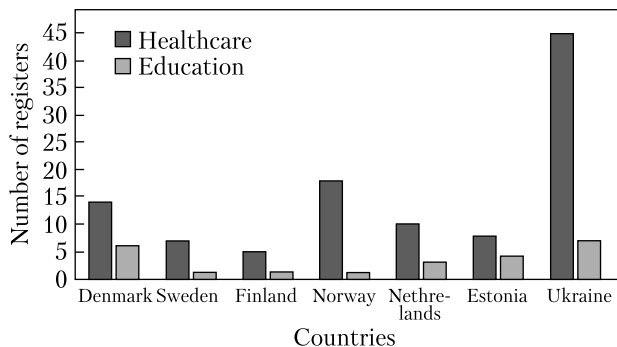


Fig. 1. Number of electronic registers of certain industries by country

Note: According to the open data, the number of ERs in the health care systems of European countries may be equal to or slightly higher than the one shown in the diagram.

Sources: [14, 15].

significant in the midst of the pandemic, that this register became necessary.

It is clear that the state of the health care system directly affects the demographic processes in the country: the birth rate, survival of newborns, life expectancy, mortality from diseases, etc. However, the number of electronic registers created in Ukraine in recent years in EHS significantly exceeds their number in the systems of European countries (Fig. 1). Even the most extensive Norwegian ER system “lags far behind” ours. Moreover, it should be noted that there are also registers in Ukraine that are not included in the EHS central database, for example, the National Cancer Registry is among them. Electronic medical information systems, the number of connections of which is constantly growing, also play an important role in the EHS. It is with their help that patients, medical personnel, pharmacists can receive the necessary information from the system according to their level of access. Medical information systems include hel.si.me, Medcard24, MedAir, Apteka 911, Tabletki.ua, etc. [16]. Therefore, the availability of structured information about patients, medical personnel, availability of medicines and hospitals, etc., makes it possible to improve the provision of medical services to the population.

In the countries with a high level of education, people are less likely to get sick, have a lower mortality rate and have a longer life expectancy. To store and provide information on the level of education of the population, providers of educational services, issued documents on education, qualifications of educators in Ukraine, the Unified State Electronic Database on Education (USEDE) was created, which currently contains 6 registers [17]: Register of educational entities, Register of Education Documents, Register of Certificates of Independent External Evaluation, Register of Student IDs, Register of Teaching Staff Certificates, Register of Teaching Staff. The seventh ER, Register of Education Seekers, is also planned for creating [18, Art.74]. It should be noted that, according to the latest version of the Law of Ukraine “On Education”, the Register of Teaching Staff should be renamed to the Register of Teaching and Research Staff, which is probably related to giving more importance to the scientific work of teachers in the education system.

Social systems, and their ERs in particular, play an important role in ensuring the quality of life of the country’s residents. Until 2021, the Ministry of Social Policy was the holder of a number of electronic registers, which were created to support the provision of services in a number of areas: allocation of subsidies for the population, assistance to low-income families, people with disabilities, internally displaced persons (IDPs), etc. After the decision to create the Unified Social Sector Information System (USSIS) in April 2021 [9], the Ministry of Social Policy began reorganizing existing ERs and filling the newly created ones with relevant information. For example, in 2022, all regions of Ukraine were already connected to the system to provide social services to IDPs, and in early 2023, the Register of Social Service Providers and Recipients started to work. The central ER of the system is the Unified Social Register (USR), which is supposed to contain information about all recipients of social support, i.e., when it was created, the necessary data should have been uploaded from all available information systems

held by the Ministry of Social Policy [9, para. 7], with further accumulation of data in the course of its operation. It is clear that the introduction of a centralized register would allow verifying the available data, avoiding duplication of data in specific social field ERs, updating information by removing, in particular, outdated information, and saving money on maintaining separate registers. Besides, as stated in the draft law “On the Unified Social Register” [19, Art. 10], the USR shall interact with the electronic information resources of other systems: both with the basic ERs and with the registers of the Pension Fund, the State Tax Service, EHS, RTC, USEDE, information resources of the managers of apartment buildings, associations of co-owners of apartment buildings, providers of communal services, etc. But the said draft law was rejected in February 2024 [19]. Search in the open sources for the regulations on the ESR, which, according to [9, Art. 7] had to be approved by the holder of the system (Ministry of Social Policy), has not given a positive result. Instead, the Ministry of Social Policy developed a draft law on USSIS [20] and sent it to other authorities for consideration. Thus, at the moment it is not clear whether the data will be available for the ESR only from the registers, the holder of which is the ministry, or also from the ERs of certain other information systems.

An important component of the information base for studying demographic processes is the availability of data on population migration. And while information on IDPs, who have registered or declared their new place of residence (stay) in the registers of territorial communities, is available (although not all displaced persons can properly comply with mandatory registration), in our opinion, it is difficult to get an idea of the number of external migrants-citizens of Ukraine who have gone abroad for various purposes, but not for permanent residence, based on the information of the State Border Guard Service of Ukraine (SBGSU) which has been published. As for the latter indicator, it is published quarterly by the State Migration Service of Ukraine. For example, the Ser-

vice’s performance report for 2023 indicates that 3152 people left for permanent residence during the year, and 526 people returned to Ukraine [21]. Thus, according to the Regulations on the Integrated interdepartmental information and telecommunication system for the control of persons, vehicles and cargo crossing the state border (ITS “Arkan”) [22, para. 3], the information about persons leaving or entering the country should be contained in its ERs. However, it is not known whether border guards ask about the purpose of traveling abroad. The Regulation on the DB on persons who have crossed the state border [23, para. 9] states that this database contains only general information about a person who has crossed the state border of Ukraine: surname, full name, patronymic name (if any), date of birth, UENR (if any), gender and citizenship.

Thus, the following questions arise:

- ◆ whether information about the purpose of citizens’ travel abroad is collected and registered;
- ◆ whether it is possible to find out which country a person is going to when crossing the border;
- ◆ whether the SBGSU compares the information about a person who crossed the border in one direction with the information about crossing the border in the opposite direction to find out how long the person has been outside the country, and whether such statistics are available.

The answers to these questions would make it possible to roughly calculate the number of migrants according to the directions and goals of migration. In our opinion, the collection of such information could be organized by the distribution of small questionnaires with certain questions by representatives of the SBGSU at border checkpoints (in trains, this can be done by conductors, in buses and cars by border guards while transport is waiting in line). This is what some public and research organizations are doing, trying to collect information about people who are crossing the border, but it is done sporadically and does not cover a significant number of respondents.

PROSPECTS FOR THE DEVELOPMENT OF THE SYSTEM OF ELECTRONIC REGISTERS IN UKRAINE

As already mentioned above, PERs function effectively in the country if they are integrated into a system of electronic information resources. In our opinion, several conditions shall be met for this integration:

- ◆ creation of ERs in all important areas of the state's functioning which are necessary for providing services to natural and legal persons, public organizations, associations, etc;
- ◆ unification, where possible, of the software and technological support for the operation of these resources;
- ◆ introduction of specific keys (identifiers) that will enable linking all necessary information about register units.

It should be noted that in recent years the Ministry of Digital Transformation of Ukraine has taken many progressive steps towards inventory of existing ERs and creating a future system.

According to the resolution of the Cabinet of Ministers [24] in 2023, the Ministry of Digital Transformation began to create the Register of Public Electronic Registers (abbreviated as Register of Registers) on the basis of the National Register of Electronic Information Resources (NREIR) by modifying the latter. The Regulation on the National Register of Electronic Information Resources was adopted back in 2004 with the aim of introducing a state repository for recording all electronic information resources of the state: electronic registers, cadastres, classifiers, and information systems that ensure their functioning [25]. But it began to work actively only in recent years: the first information published by it regarding registration dates back to 2018. Currently, information from NREIR is provided in the form of a list of electronic resources registered in it with information about the status of the implementation of the resource (functioning / being created / being modernized), and about the connection status to the system of electronic interaction of state electronic information resources

“Trembita” (integrated / not integrated), date of relevance of information [26].

The Register of Registers is a state information and communication system designed to compile a list of information on PERs, classifiers, reference books, etc., as well as information and communication systems that ensure the functioning of public electronic registers and their electronic information interaction [24, para. 3]. Thus, the Ministry of Digital Transformation continues to fill in the existing NREIR and simultaneously creates the Register of Registers, all objects of which should work in the “Trembita” system. So with the system of registers operating on the “Trembita” platform, the necessary information will be obtained by the state bodies to perform their functions; and researchers will be able to use summarized information about the country's residents necessary for studying demographic processes.

The state and future prospects for the development of the register system in Ukraine were definitely affected by the Russian-Ukrainian war that began in 2014, and the COVID-19 pandemic of 2020–2023. To improve the information environment in the healthcare sector during the pandemic, appropriate registries should have been created to store information on those vaccinated not only against the SARS-CoV-2 virus but also against other infectious diseases. For example, the Immunization Register to collect and summarize information on mandatory routine vaccinations and the use of vaccines during epidemics, or the Infectious and Viral Disease Surveillance Register (such registers exist in Norway). The Register of infectious diseases in the EHS might have been introduced within the framework of the Electronic Integrated Disease Surveillance System [14]. As for the Immunization Register, no such information is currently publicly available: as mentioned above, the Ministry of Health does not publish information about existing registers and information and communication systems of the EHS. It would be extremely relevant to create a Register of hospital utilization (occupancy), which would allow for accurate and up-to-date information in

digital form to support decision-making on referring patients to hospitals in certain regions when hospitals in other regions are overloaded.

Martial law imposed many additional obligations on the state, in particular, in the area of maintaining the mental health of citizens, both of those who returned from the front and those who were under the fire and bombardment in the front-line regions and the rear. The decision of the Ministry of Veterans Affairs of Ukraine in 2022 to create a Register of Providers of Psychological Rehabilitation Services for Veterans and Their Family members [27], and later the Register of Providers of Psychological Assistance Services for Veterans and Their Family Members [28], was of great importance. Thus, thanks to the information on specialists and organizations that can provide psychological assistance to war veterans, persons who have special merits to the Motherland, family members of such persons, affected participants of the Revolution of Dignity, family members of killed (deseased) war veterans, family members of killed (deceased) defenders of Ukraine contained in this register, they can receive relevant free services.

Back at the beginning of the war, the Law of Ukraine “On Sanctions” was adopted, in which in 2023 the articles were included about the creation of the State Register of Sanctions, its holder, the apparatus of the National Security and Defense Council of Ukraine, and about the procedure for its maintaining and access to it [29, Art. 5³–5⁴]. Therefore, currently the up-to-date information is available for public access about the entities that have been sanctioned on the basis of enacted or approved decisions of the National Security and Defense Council of Ukraine. Today, it contains information about more than 10,000 individuals and 7,000 legal entities [30].

Another registry was built during the war, being the most recent one, starting in April, 2024, it is the Registry of Damages Caused by the Aggression of the Russian Federation against Ukraine (RD4U) [31]. The register was created under the auspices of the Council of Europe, it is “...the only international instrument for recording the dama-

ge caused by the full-scale invasion of Ukraine by the Russian Federation, ... and the first component of the compensation mechanism, the purpose of which is to ensure full, fair and effective reparations for the victims of the war” [32]. Currently, claims are accepted only in one category – damage or destruction of residential realty. Later in the year, claims will be accepted from natural persons, businesses and from the state of Ukraine “...for more than 40 categories of damage, including loss of life, bodily injury, torture and sexual violence, forced deportation, loss of property and other economic damage, as well as damage caused to historical and cultural heritage and environment” [32].

Thus, it can be stated at the moment that Ukraine is now confidently moving towards the creation of a system of electronic information resources (“Trembita” information and telecommunication system), which will provide the necessary amount of information to state institutions and society, improving the quality of governance and providing administrative services to the population. To achieve this goal, it is necessary to have not only a complete register of all information resources (which is being formed), but also the main keys for their interaction (interoperability), which have not yet been fully implemented in Ukraine: there is no identifier of natural persons that would uniquely identify them in all registers, and no identifier of addresses. It is clear, that it is difficult to conduct full-fledged research in demographic processes without the necessary summarized information on the population, which for many reasons is currently lacking:

- ◆ the absence of a population census for more than two decades;
- ◆ unavailability of data from the temporarily occupied territories;
- ◆ insufficient information on natural persons in the UDDR for demographic analysis;
- ◆ impossibility to combine information from different ERs, etc.

Previously, we proposed to use in the meantime the complex transitional keys for information

interaction between electronic registers and the possibility of establishing pairwise connections between ERs [7, pp. 526–536]. Currently, in our opinion, it is urgent for the study on demographic processes, in addition to the previously mentioned, to improve the interaction of the registers of territorial communities as the primary source of information about the population, both between each other and with the EHS, USEDE, the registers of the Pension Fund of Ukraine, STSU and USSIS. The connection of communal services in the regions to the RTC and USSIS registers is also useful.

Besides, in the absence of information on EHR registers, (by analogy with the healthcare EHR systems of the Northern European countries) we propose to add the following registers:

- ◆ a register of drug addicted patients and a drug treatment register;
- ◆ a register of twins;
- ◆ a cardiovascular disease register;
- ◆ an antibiotic use and related infections surveillance register;
- ◆ an antibiotic resistance register;
- ◆ an antiviral medicines resistance surveillance register;
- ◆ an immunization register;
- ◆ a hospital utilization (occupancy) register;
- ◆ a register of hospital errors;
- ◆ a register of patients with tuberculosis.

The implementation of the rehabilitation register, which would contain information about all persons who need various types of rehabilitation services, should, in our opinion, be carried out under the auspices of several departments: the Ministry of Health, the Ministry of Defense, the Ministry of Veterans Affairs and of territorial communities. That is, interaction should be established immediately: between EHS, the medical register of the Ministry of Defense, the register of veterans of the Ministry of Veterans Affairs, and with RTC. Connecting territorial communities to this interaction is important, in our view, due to the need to provide rehabilitation services (specifically, recovery after wounds, trauma, strokes,

heart attacks, etc. and prosthetics) to both the military and civilian population. People who live far from the large medical centers do not always seek rehabilitation services themselves, on their own initiative, so the relevant services could find them much faster using information from local communities.

In our opinion, it is important to create a register of migrants according to the purpose of migration (education, work, refugees, etc.) and the country of destination (when leaving Ukraine). If such data is already contained in other ERs of the SBGSU, then their systematization and publication in a generalized form will contribute to more accurate calculations of demographers.

Due to the Russian-Ukrainian war, the State Register of Property Damaged and Destroyed as a result of hostilities, terrorist acts, and sabotage caused by the military aggression of the Russian Federation was introduced, but, in our opinion, it should be combined with information on those in need of housing. If such data exist at the level of territorial communities, it is currently unknown whether they are unified throughout the country. This can be, for example, information about low-income families with many children or families of veterans, residents of Chernobyl, etc., i.e., what was called the “queue for housing” in the peacetime. Part of the families from these queues may have become IDPs, and their homes may have been destroyed. During the war, new information is appearing about those who need housing on a preferential basis. Therefore, information from various sources shall be summarized and systematized, and this can be implemented exclusively on the basis of electronic information resources.

A separate direction is the creation of a system for using register data for statistical purposes. This requires regulatory, organizational, technological and methodological coordination between the state statistics authorities and register holders. Information interaction can be ensured either by creating registers for statistical purposes

from existing registers by depersonalizing the data or by obtaining information in aggregated form in a predefined format.

Thus, in order to create a full-fledged system of public electronic registers, it is necessary to conduct an inventory, make the necessary modifications to a number of existing electronic registers and introduce new ones, update information in

registers and databases, and introduce the necessary identification codes to link information from different resources. To obtain information for the purpose of studying demographic processes, such resources as the USDR, RTC, EHS, registers of the SBGSU and the Pension Fund are particularly important, but most of them, in our opinion, need further improvement.

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ДОСВІД ВИКОРИСТАННЯ ЕЛЕКТРОННИХ РЕЄСТРІВ ДЛЯ ДОСЛІДЖЕННЯ ДЕМОГРАФІЧНИХ ПРОЦЕСІВ В УКРАЇНІ

Вступ. За наявності системи електронних реєстрів доступ до узагальненої інформації про мешканців країни значно полегшується, що сприятиме відповідним розрахункам чисельності, статеві-вікового складу, смертності, народжуваності, очікуваної тривалості життя тощо та підвищить їхню точність і якість. Особливо актуальними такі розрахунки стають під час та після закінчення війни.

Проблематика. В Україні розпочато створення системи публічних електронних реєстрів, але ще не запроваджено усі необхідні ресурси, а наявні не мають відповідної структури та не наповнені інформацією, через відсутність певних ідентифікаторів ускладнена можливість зв'язування інформації з реєстрів.

Мета. Узагальнення досвіду створення електронних реєстрів в Україні для дослідження демографічних процесів та формулювання пропозицій щодо запровадження нових реєстрів і певних ідентифікаторів.

Матеріали й методи. Застосовано системний аналіз, наукове узагальнення та порівняльний аналіз, методи дослідження складних систем.

Результати. Дослідження наявних в Україні певних електронних інформаційних ресурсів дало змогу визначити перелік електронних реєстрів, що можуть бути використані для проведення демографічного аналізу, запропонувати для удосконалення майбутньої системи електронних реєстрів запровадження нових ресурсів і певної системи ідентифікаційних ключів у цій системі, а також створення реєстрів для статистичних цілей.

Висновки. Для створення повноцінної системи публічних електронних реєстрів необхідно провести інвентаризацію та здійснити необхідну модифікацію певного ряду наявних електронних ресурсів і створити нові у визначених сферах функціонування держави, актуалізувати інформацію в реєстрах і базах даних, запровадити необхідні ідентифікаційні ключі для об'єднання інформації з різних реєстрів. Більшість наявних реєстрів потребують оновлення та подальшого удосконалення.

Ключові слова: система електронних реєстрів, демографічні процеси, реєстри населення.