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Decentralization of Mental Health Care as One of the Key Pillars of the Republic of Serbia Health Reform: The Importance of the Information Integration

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Abstract Healthcare system reforms are ongoing and are considered globally. However, Serbia's social, political, and economic crises have slowed progress, which started in 2002. Decentralization is regarded as critical for improving healthcare services and ensuring financial sustainability. The development of Community Mental Health Centers is considered the cornerstone of the decentralization strategy. A comparative analysis of Big Data on national public health highlights critical issues. According to our findings, it is essential to rethink the models and procedures of a review of the existing healthcare facility network and examine the local population's mental health status and health service usage. One of the appropriate procedures may be the unification and centralization of data collection and storage processes for mental health centers in the national network, both private and public. However, the decentralization processes must be balanced with centralization principles, as they are sensitive to social, historical, political, and economic influences.

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1 Introduction

An optimally functional health system exerts the highest positive impact on population health, equitableness of the healthcare system (HCS) use and financing, and whose financial sustainability is constantly being improved (Krstić et al., 2019). Thus, HCS reforms are continuous processes and are under consideration in countries throughout the world, no matter their level of income or development (Marušić & Prevolnik Rupel, 2016). The HCS reform in the Republic of Serbia (RS) started in 2002 (Gajić-Stevanović, 2015). After two decades of intensive effort and planned activities of different social structures and organizations, there are some major issues that it have to be addressed. Namely, repeated social, political, and economic collides and crises left a significant mark on the HCS, and they rolled back the reform progress. The HCS economic reform, i.e. its decentralization has been considered as one of the most priority measures (Gavrilović & Trmčić, 2013). It implies a balance between providing health service improvements and a model of HCS financial sustainability (Vakkala, Sinervo, & Jäntti, 2021). According to Bjegovic-Mikanovic et al. (2019), the HCS's magnitude of gaps between incoming and outgoing funds is illustrated by 2 million employees insuring 7 million insureds. The same authors pointed out that this results in a significant shortfall in the National Health Insurance Fund (NHIF), leading to higher out-of-pocket costs for the already vulnerable population. Out-of-pocket expenditures can have a variety of influences on HCS organizations. For example, when private out-of-pocket financial contributions increased in Slovenia, so did the scope and intensity of informal care (Hlebec, 2017).

The Community Mental Health Centers (CMHC) is the proposed cornerstone of the HCS reform i.e. decentralization process in a social, territorial, organizational, and economic sense (Lecic-Tosevski, Draganic Gajic, & Pejovic Milovancevic, 2010; Lecic-Tosevski & Milosavljevic, 2021). The development of the CMHC network implies a revision of the existing healthcare facilities (HCF) network. It requires an examination of the local population's mental health (MH) status or morbidity and use of health services.

A comparative analysis of two sets of Big Data points out some critical issues in this regard. The first set of data originates from the 2015-2020 annual surveys of the Institute of Public Health of Serbia "Dr Milan Jovanović Batut" (IPHS, 2017, 2018, 2019, 2020, 2021). The Institute is a reference institution that, among other things, organizes the gathering and publication of information from the field of national public health every year, which serves as a ground for planning evidence-based health policy. The second data set originates from the latest population study "The 2019 Serbian National Health Survey". This is research on citizens' health status, health behavior, and HC utilization undertaken by The Statistical

Office of the Republic of Serbia, IPHS, and the Ministry of Health (Milić, Stanisavljević, & Krstić, 2021).

2 Literature review

2.1 The determinants of MHC

The MHC conceptualization, main principles, organization, and financing in RS are determined by specific sociocultural, political, and economic factors. Namely, during the past several decades most residents experienced multiple challenges, adversities, traumas, losses, insecurities, fears, and sorrow due to socio-politically circumstances and natural disasters (Popovic, Terzic-Supic, Simic, & Mladenovic, 2017). The country is still in transition from a socialist system and economy to a "welfare state" (market economy and democratic society) (Simović & Vukša, 2022). Regarding income RS is an upper-middle country (Krstić et al. 2019). The public spending on health is above the average for South-Eastern European countries and the insurance covers a wide scope of services and 98% of the population, but there is a high incidence of catastrophic and impoverishing out-of-pocket payments (Richardson & Bjegovic-Mikanovic, 2022). In line with the previously stated, it is understandable why Krstić et al. (2019) pictured Serbia's MHC as a mixture of Soviet Semashko and German Bismarck models.

2.2 The MHC reform process

Before 2002, the predominant MHC model was the Semashko model. Every citizen has a universal right to MHC free of charge. The specialized institutions (institutes, clinics) were the bearers of MHC. Financing was realized by the system of a centrally-planned economy. Thus, according to the Centar za Visoke Ekonomske Studije [Center for Advanced Economic Studies] (CEVES, 2006), the former Yugoslav Republic's heritage of accessible and quality health care (Hc) has left a solid infrastructure but high expectations of citizens from health services.

Previously mentioned human and natural catastrophic events and losses, and the transformation of the former socialist country toward liberal capitalism requested the transformation of one of the key social systems—the system of HC, including the MHC. One of the main problems was how to keep MHC free of charge and available for every citizen since the funds are limited. With an increase in the number of unemployed citizens during crises and state transformation, funds additionally declined. The shortage of drugs and materials was one of the most direct effects of overburdened public insurance funds. Reducing medical staff salaries has led to the migration of professionals into private practice or more developed countries. Besides that, patients are used to choosing highly specialized medical services i.e. facilities, even though they could benefit from the MHC

primary level services. Thus, some facilities (highly specialized, in urban areas, especially in the capital city) were overloaded, and some others had unused capacities (outpatient centers or inland hospitals). Since salaries were not dependent on the number of services provided, employees in overburdened HCF were even more unsatisfied. The MHC system was in front of collapse. The major goals of the reform were to resolve the weakest spots of the previous HCS – to establish order in patient flow throughout the HCS, to manage a load of medical professionals, and to rationalize health insurance expenditures.

The Bismarck model slowly emerged. The discernible elements of this model, which are now visible in MHC are decentralization, with primary HCS as a gatekeeper to the system, and evidence-based medicine (Krstić et al., 2019). The other Bismarck's key elements (effect-based payments, significant capacity reduction) are still more tendency, than reality. But, after almost two decades since the reform was started, there is some major weakness in the system. Now, the primary HC system has become overloaded. In addition, the problem of the drug market or the price of medical drugs persisted. But, it is not an isolated case. Despite the growing tendency of organizational changes and its significant role in today's highly competitive and continuously evolving business environment, the evidence shows a low change success rate (Čudanov, Tornjanski, & Jaško, 2019). The question that emerged was — how to make HCS more sustainable? Effect-based payment seems an acceptable solution but do we have an appropriate assessment methodology? Besides that, what will look like a significant capacity reduction in real life? What to do with patient needs? Public HC needs to be affordable for all citizens (Rogelj & Brezovnik, 2013). So, the different models and indicators were used to create a sustainable HCS.

2.3 Research on HC as an ongoing reform base

The research can be roughly divided into two groups: research on cost and research on the organization. It is important to bear in mind that this division is didactic. In reality, those two sets of data are intrinsically linked. The optimal organization of the HCS saves means from insurance funds. On the other side, available financial resources determine the organization of HC (e.g. services availability, facilities capacities, services scope...)

2.3.1 Research on HC costs

When it comes to how the costs for HC are presented, they are subject to different criteria and linked to numerous indicators (CEVES, 2006). These are the allocation of material resources for HC per capita, the consumer basket concerning the allocation for HC per capita, the percentage of the total gross national income, etc. After the beginning of the worldwide economic crisis (2009–2016), the

growth of health spending in terms of PPP in RS slowed down, and from 2014 to 2016, it fluctuated around the resulting plateau value (Krstić et al., 2019). For instance, the overall HC expenditure per person in RS in 2010 was $545 per capita or $1,218 PPP. After five years of increase, there was a significant dip in 2015 to $494 per person ($1,323 PPP), with government spending on health accounting for 57.7% and out-of-pocket spending accounting for 40.06% (World Health Organisation [WHO], n.d.-a). By 2020, it progressively grows again to $672, with government health spending (61.0%) rising and out-of-pocket expenses (35.9%) falling (WHO, n.d.-a).

Globally, comparable data on the allocation of Serbian citizens for HC show that these are significant investments, possibly the greatest in the region. Namely, the percentage of allocations for the health sector as a percentage of GDP in RS is the highest compared to the Western Balkans countries (Gavrilović & Trmčić, 2013; Krstić et al., 2019). Thus, RS had a rate of 9.88% in 2010, which was higher than the European Union average and higher than Albania, Bulgaria, Croatia, the Czech Republic, Estonia, Finland, Hungary, Latvia, Lithuania, Luxembourg, Montenegro, Poland, Romania, Russia, the Slovak Republic, Macedonia, Turkey, and others. (Gavrilović & Trmčić, 2013). RS's rate in 2010 was similar to Belgium, Austria, Greece, and Bosnia and Herzegovina rates. However, because of the short national GDP in crisis conditions, the real amount of money allotted for health is insufficient for the population's true needs and for the HCS under the current organization (Gavrilović & Trmčić, 2013). As a result, the FHI's total income in 2009 was 1,864,370,458 EUR (Gavrilović & Trmčić, 2013). Within that, social contribution funds account for 69% of the total. The Ministry of Health budget transfers contribute 1.5% of the means. Employee pay had the highest percentage of the expense structure (48%). The prices of HC services (offering energy, immunizations, prescriptions, and consumables) (32%), pharmaceuticals (13%), illness reimbursements and travel expenditures (2%), and so on, are then included.

Due to the above, it is not surprising that the allocations for out-of-pocket payments are the highest in the region, with a tendency to increase (CEVES, 2006; Bjegovic-Mikanovic et al., 2019). Nevertheless, an increasing investment in prevention is noticeable. In 2009, for the Preventive Health Protection Program, the Ministry of Health's budget was allocated 27,319,954.73 EUR (49% of the total Ministry budget) (World Health Organization. Regional Office for Europe., Netherlands Institute for Health Services Research., & Institute of Public Health of Serbia "Dr Milan Jovanović Batut", 2010).

2.3.2 Research on HC organization and functioning

There are several interesting facts concerning the current organization and functioning of the HC system in RS (WHO, n.d.-b). Per 100,000 inhabitants, RS

has fewer hospitals (1.46) than Croatia (1.56), Montenegro (1.77), and the EU (1.76), but more than Bosnia and Hercegovina (1.13), and similar to Slovenia (1,41). But, per 1.000 inhabitants, RS has more hospital beds (5.6) than Slovenia (4,4), Bosnia and Herzegovina (3.5), Montenegro (3.9), and even the EU (4.6), and is close to Croatia (5.5). Thereby, the hospitalization rate in RS per 100 inhabitants was 14.7%, which was higher than in Montenegro (13.4%) and Bosnia and Herzegovina (11.1%). Simultaneously, the average length of hospitalization in RS was 9.7 days, while in Slovenia it was 6.8, in Bosnia and Herzegovina it was 7.5, in Montenegro it was 8, in Croatia it was 8.4, and in the EU it was 8.16 days.

The review of the WHO European Health Information Gateway database (n.d.-b) also shows that the average length of stay for inpatients was notably longer for mental and behavioural disorders. In 2021, the average length of hospitalization in RS regarding "F diagnosis" was 33.3 days (the lowest in the previous decade), while in Montenegro it was 34.9, in Croatia 27.5, in Slovenia 27.3, and in the EU 8.16 days. In 2021, the total number of hospital days in RS was 7,593,320, with 1,199,255 patients discharged from inpatient health institutions. The typical duration of hospitalization per patient was 6.3 days, while the average occupancy rate of beds in hospitals was 48.7%.

Since 2015, the total number of psychiatrists in Montenegro has been maintained at the initial level (about 81); in Croatia, it increased until 2020, with a slight decrease in 2020 (from 652, through 683, to 679). In Slovenia, the number of psychiatrists is continuously growing (from 264 to 338). In RS, it is continuously decreasing, from 962 to 781 (2021 data). In 2020, there were from 9.2 to 28.2 psychiatrists for every 100,000 people in the European Union. Thus, in 2020, there were 11.3 psychiatrists per 100,000 inhabitants in RS, 13 in Montenegro, 16.1 in Slovenia, and 16.7 in Croatia. One of the biggest problems is the uneven workload of doctors in different districts. So, for example, in the Nišava district, the largest number of doctors concerning the number of inhabitants was registered (396 per 100,000), while in the Srem district, the number of doctors concerning the number of inhabitants was the smallest (188 per 100,000) (IPHS, 2020). According to CEVES (2006), these inequities are mostly due to missing specializations. They are indicative since they reveal the absence of population health monitoring trends and a lapse in adapting the system to real needs.

2.3.3 Current systems for registering MHC parameters in RS

According to CEVES (2006), the correctness of data is a prerequisite for creating an effective health policy. In RS, health institutions (state and private) are required to prepare and submit prescribed reports to the IPHS and the NHIF based on health documentation. At the same time, the accuracy of the data largely depends on the interests of both the immediate executors (the doctor/nurse team) and the

management of health institutions. On top of that, the content of the questionnaires themselves, that is, the methodology by which they are collected, is also important. A review of the WHO MH Atlas (WHO, 2022) indicates that there is still a significant share of missing data, especially in the section „The MH Service Availability and Uptake", albeit with marked indications of improvement of records compared to previous years being visible.

In RS, there are currently several IT solutions for registering MH parameters such as Healthix HIE (Health Information Exchange), Heliant Health information system, or the Integrated Health Information System of the RS (IZIS). Health institutions choose the system following the recommendations of the relevant authorities or institutions of the autonomous provinces, that is, the Republic, and sometimes as part of a specific project enrolment. The mentioned systems have different data registration methodologies, their health indicators are partly different from each other, and the systems are not mutually connected. Data from systems can only be obtained based on the approval of each health institution separately. Health institutions submit data to IPHS according to unique parameters, but a significant amount of important data remains invisible. First of all, these are data on patients treated in the private sector. Secondly, as part of the anonymization of data, there is no possibility of monitoring patients individually in the MHC system.

2.4 MH service organization two decades after the onset of the MHS reform in RS

An HCF is established using finances from the State or private ownership by the Republic, an autonomous province, local self-government, or an individual. The Republic, autonomous province, municipality, or city establishes state-owned HC facilities in compliance with the government's HCF network plan.

2.4.1 The Plan of the Network of HCF

The Plan of the Network of HCF (PNHCF) is based on ("Zakon o zdravstvenoj zaštiti [Law on Health Care]", n.d.): 1) the development plan; 2) the population's state of health; 3) the population's number and age structure; 4) the existing number, capacities, and distribution of HC amenities; 5) the level of urbanization, development, and communications in specific areas; 6) equal access to Hc; 7) the necessary breadth of certain levels of Hc activity; and 8) the Republic's economic capabilities.

The PNHCF describes the number, structure, capacity, and geographical placement of HCF and their operational units according to HC levels. According to CEVES (2006), since 1997, changes in the PNHCF most often included only

the renaming of institutions or the separation of health centers and the like, without significant transformations and redistribution of capacities. At the same time, the HCS does not include data from the private sector in the process of planning HC funds and capacities.

2.4.2 MHC levels: Jurisdiction and functional integrity

MHS in Serbia is characterized by a hierarchically organized, precisely defined, and branched network of health institutions, predefined to provide a specified level of Hc (Lecic-Tosevski et al., 2010; Bjegovic-Mikanovic et al, 2019; Svetozarevic, Vukcevic Markovic, Pejuskovic, & Simonovic, 2019). Certain peculiarities of the MHS organization add complexity to the question of the correctness of gathered MHC data. MHC activities are mandated by Law at the primary, secondary, and tertiary levels ("Zakon o zdravstvenoj zaštiti [Law on Health Care]", n.d.). HC services at all levels are professionally and organizationally interconnected to ensure the proper flow of patients across the system and the sharing of expert knowledge and experience.

On the primary level, MHC activity operates out of outpatient departments (OD) and institutes. The following doctors provide primary health treatment at the OD: a medical doctor, a general medicine practitioner, an occupational medicine specialist, a paediatrician, a gynaecologist, and a dentist. Each patient has the right to a primary HC doctor of their choice—the chosen doctor, similar to the concept of case management. The chosen doctor manages health insurance, performs examinations, and diagnoses, determines treatment methods, monitors progress, coordinates treatment suggestions, refers the insured to a specialist or inpatient care, prescribes medications, maintains documentation, provides opinions, issues certificates, and performs other tasks related to exercising insurance rights. In some scenarios (for example, a staff shortage or increasing demand for a specific expert profile), under the conditions determined by the Minister of Health, the chosen doctor might additionally be a doctor of medicine in another speciality. Secondary-level HC facilities are hospitals, and they continue the assessment, therapy, and rehabilitation that began in the outpatient department. The majority of patients are diagnosed and treated in polyclinic services as outpatients. Inpatient treatment is recommended only when it is necessary. Tertiary HC activities comprise the most complicated forms of HC and specialized, consulting, and inpatient HC activities, along with research, and education. HC facilities on tertiary levels are clinics, institutes — centers of excellence, clinical hospital, clinical center, and institutes of public health. If there are no primary level facilities in the seat, secondary and tertiary level facilities may engage in the relevant primary level activity for the area for which it was formed.

In 2016 (Lecic-Tosevski & Milosavljevic, 2021), for example, there were seven psychiatric hospitals, 36 psychiatric sections in general hospitals, and four CMHCs. The overall number of MHC providers (including government and non-government) was 2,643 (29.86 per 100,000 people). Inpatient care (per 100,000 population) included 41.41 hospital beds with 127.07 annual admissions and 18.33 psychiatric unit beds in general hospitals with 209.97 yearly admissions. Within one month, more than 75% of released inpatients received a follow-up outpatient visit.

What does the flow of information through such an organized system look like in practice? Consider the case of an inland person with a suicide attempt by pill. In a life-threatening condition, the individual may be treated in the emergency department, followed by intense therapy and resuscitation department, and eventually in the MHF. If gastrointestinal problems are most prominent and the suicide attempt is concealed, internal medicine may be the first instance. If suicidal tendencies are detected during treatment, the individual may be referred to the psychiatric department. If suicidal inclinations are covered, legal guardians or spouses may refuse to consent to mandatory hospitalization, and the individual is going to be returned home. In other situations, the person may later visit the MH department due to the psychological suffering that led to the medication misuse in the first place. It is understandable from the example that an organized system for collecting and analyzing epidemiological data would include a complex interplay between law enforcement and HCFs. Otherwise, it is difficult to acknowledge and comprehend the pathogenesis and prognosis of suicidal behaviour in order to prevent suicide. But appropriate ICT interconnection is not always the case.

2.5 Toward future improvement of the MHC system in RS

An improved system of MH protection for the implementation of prevention, treatment, and provision of comprehensive, integrated services, following the best international practice, is the general objective of The Action Plan for the implementation of The MH Protection Program in the RS for 2019-2026 (in further text: The 2019-2026 Action Plan) (Ministry of Health of the Republic of Serbija [MHRS], 2019).

2.5.1 The Community MHC in RS

Serbia began establishing community-based MHC centers in 2007 as part of the country's psychiatric reform (Lecic-Tosevski & Milosavljevic, 2021). The primary HC system coordinated these efforts. Each of these centers formed its MHC team. The goal was to make MH treatment services more accessible while at the same time lowering institutionalization and stigma. The first CMHC was opened in 2005 in the City of Niš (southern region). In 2015 it was established MH centers

in Kikinda (northern region) and Vršac (north-eastern region), in 2018 in the City of Belgrade, and in 2022 in Pančevo (north-eastern region). Most of them are connected to MH hospitals in their assigned areas. The exception is the CMHC Belgrade, which is organizationally connected also with the special hospital, but territorially is situated in Belgrade downtown.

2.5.2 CMHC as one of the cornerstones of The 2019-2026 Action Plan

The development of a network of CMHC is a key component of The 2019-2026 Action Plan (MHRS, 2019). CMHCs are either the holders or important participants in the implementation of measures of The 2019-2026 Action Plan. The measures are the development and improvement of MHC services in general, improvement of MHC priority subpopulations (young, old, persons who have been sentenced to mandatory treatment), strengthening of prevention, improvement of human resources, research, and education, mental illness stigma challenging.

The territorial coverage of the CMHC concerning the total population of RS is a key indicator of the effect of The 2019-2026 Action Plan's general goal. It is planned to increase the number of CMHC from 5 to 20, i.e. increase the territorial coverage of CMHC concerning the total number of RS inhabitants from 2.32% to 15% (MHRS, 2019).

3 Method

3.1 Problem

Unlike the existing CMHC in RS, by The 2019-2026 Action Plan, the newly formed CMHC should be allocated in the community, as close as possible to the place of residence. Thus, regarding CMHC network planning, one of the important practical issues is the optimization of the territorial distribution of the CMHC.

Different approaches can be applied when planning the CMHC network. One of the possibilities is to allocate CMHCs by administrative districts[1] of the RS. Furthermore, a guide for planning the CMHC network can be data on the number of health services provided in the field of MHC by district, as well as data on the MH state of the population obtained from a representative sample. The two data types do not have to match exactly.

3.2 Objective

The main objective of this analysis was to explore the relationship between the number of provided MHC health services and the frequency of MH problems in a representative national sample, by the administrative districts.

3.3 Data samples

For this purpose, selected indicators of two Big Data sets were compared.

The first set of Big Data is data from national health status monitoring and analysis for the period 2016-2020 provided by IPHS. IPHS is an essential HC facility in RS that concentrates on crucial national activities related to public health. It plays a decisive role in planning evidence-based health policies. All HC institutions from the National Health Institutions Network Plan actively participate in information gathering. The outcomes of these efforts are annually published, to some extent, in the "Health Statistical Yearbook of the Republic of Serbia." This comprehensive yearbook presents vital data on the population, disease prevalence, utilization of health services, citizens' lifestyles, knowledge, attitudes toward health, health service organization and functioning, and the impact of environmental variables on health.

The second batch of "Big Data" was obtained from Serbia's 2019 Population Health Survey. This was a collaborative effort by The Statistical Office of the Republic of Serbia, IPHS, and MHRS. It was based on the European Health Survey method. The research aimed to analyze the population's health status, perspectives on health, HC service utilization, and engagement in health activities. The survey adopted a stratified, two-stage sample, carefully calculated to meet accuracy requirements by following EUROSTAT's guidelines for health research. Consequently, the survey encompassed 5,114 households, including 15,621 individuals. This research includes rough data on 13,589 examinees aged 15 and above. Given the significance of MH issues, special attention was devoted to examining the presence of depression, considering its status as a leading cause of disability, and the alarming statistic that depressive disorders account for more than 800,000 lives lost annually (Naghavi, 2019).

3.4 Indicators

The chosen indicators from the monitoring and analysis of MH status for the period 2016 – 2020 provided by IPHS are: 1) the number of recognized MH disorders or conditions at the primary HC level; and 2) the frequency of hospitalizations due to MH diseases or conditions in the secondary and tertiary HC levels. The data was analyzed based on Serbia's administrative districts while considering the number of (neuro)psychiatry specialists employed in each area.

The chosen indicator from Serbia's Population Health Survey in 2019 is the number of adult residents in whom PHQ-8 determined the presence of depression (score 10-24), observed by the administrative district of the RS. Besides that, the

number of inhabitants that consulted psychiatrists, subjective statements on depression occurring during 12 months before a national health survey, and availability of HCF and reasons for unavailability (spatial and financial).

Statistical analysis: Statistical analysis was performed with the statistical package SPSS, version 23. The assessment of central tendency, variability, and frequency distributions was conducted by descriptive statistical analysis. The relationship between the provided number of MHC medical services and the number of adult residents with the presence of depression, by administrative district and a number of psychiatrists, are investigated through Chi-Square test, independent Samples t-test, and one-way ANOVA.

4 Results

4.1 Established diseases and conditions in the Republic of Serbia by year for the period 2015–2020 in the group of mental disorders and behavioral disorders (ICD-X F00–F99)

Table 1: The Chain Index based on the number of diagnosed diseases and conditions by region and at the level of the Republic of Serbia (2015–2020)

Regions		2015	2016	2017	2018	2019	2020
Serbia - North	N	19,467	19,360	18,875	18,428	18,086	13,807
	%	52.47	53.61	53.94	55.48	55.40	44.91
Serbia - South	N	17,633	16,753	16,118	14,790	14,562	16,940
	%	47.53	46.39	46.06	44.52	44.60	55.0
The Republic of Serbia	N	37,100	36,113	34,993	33,218	32,648	30,747
	$Index_{Ch}$	–	97%	97%	95%	98%	94%

$Index_{Ch}$ = Chain Index

As shown in Table 1, in Serbia-North, compared to the South, a slightly higher admission of the patients is recorded (range of 4-9%), except for the last year of the analyzed period, when the admission in the North was lower by 9%. Thereby, in the period between the two population censuses, the population density was equal in the two parts of the RS. Besides that, from 2015 to 2020, a slight decrease in established diseases and conditions can be observed. This can also be seen by comparing the following year with the previous one. For example, the ratio of the number in 2016 and 2015 is 97%, which indicates a drop of 3%, etc.

4.2 Selected indicators from two sets of "Big Data"

The data are reported for four of Serbia's five statistical regions, as the 2019 population health survey (for available data). The included regions are the

Belgrade region (R_B), Vojvodina region (R_V), Šumadija and Western Serbia region ($R_{ŠWS}$), and South and East Serbia region (R_{SES}). $R_{ŠWS}$ and R_{SES} are the largest regions, with 34.14% (26,483 km^2) and 33.84% (26,245 km^2) of the territory, respectively. R_V has 27.86% (21,614 km^2) and R_B has 4.16% (3,225 km^2).

When looking at the number of inhabitants by region (Batut, 2019), in absolute terms, the population is almost equally distributed, with the largest number of inhabitants living in $R_{ŠWS}$ (1,908,641 inhabitants, or 27.48%) and the smallest in R_{SES} (1,490,445 inhabitants, or 21.46%). The population density analysis indicates the expected concentration of inhabitants in the capital of Serbia, which is as high as 525/km^2. It is followed by R_V (86/km^2) and $R_{ŠWS}$ (72/km^2). R_{SES} has the lowest population density (57/km^2).

Table 2 provides additional pertinent information regarding the ratio of population MHC needs to services provided.

Table 2: Regional differences in the reported number of MH problems cases, the presence of depression in the population, the number and workload of psychiatrists, and the availability of MHC services

Statistical regions of Serbia	Reported F diagnosis N(%)	Depression in the previous year N(%)	PHQ-8 score in the range of 10-24 M(SD)	PHQ-8 score in the range of 10-24 N(%)	Psychiatrist N(%)	Inhabitants consulted psychiatrist N(%)
R_B	7,534(23.30)	115(18.64)	0.78(2.21)	43(15.36)	245(33.89)	41(1.3)
R_V	10,552(32.64)	154(24.96)	1.28(2.99)	85(30.36)	172(23.79)	30(1.0)
$R_{ŠWS}$	7,769(24.03)	152(24.64)	1.14(2.47)	78(27.86)	132(18.26)	13(0.3)
R_{SES}	6,478(20.04)	196(31.77)	1.40(2.95)	74(26.42)	174(24.07)	19(0.7)
Total	32,333(100)	617(100)	1.15(2.66)	280(100)	723(100)	13,178(100)

In 2019, the largest number of established diseases and conditions from the group mental and behavioral disorders (F00–F99) (ICD-X) was registered in the R_V: 10,552, or 32.64% of the total number in these four regions. The smallest number registered in R_{SES}: 6,478 or 20.04%.

During the Serbian Population Health Survey in 2019, it was discovered that, according to the statements of the respondents, the R_{SES} had the most people who had a problem with depression in the year preceding the survey (196, or 31.77%), while the R_B had the fewest (115, or 18.64%). The mentioned difference in frequency distribution is statistically significant ($\chi^2(6, N = 13,178) = .60$, $p < .001$). In 2019, the overall Serbian population sample (N = 13,178) has a lower trend (4.5% of the population) than in the previous two polls (2006 = 6.0% and 2013 = 6.7%), indicating a similar pattern to that observed in 2000 (4.6%).

A slightly lower percentage of those suffering from depression was determined based on PHQ-8; that is, it was shown that 2.1% of the population shows symptoms of depression (PHQ-8 ≥ 10 ≤ 24). Observed by region, the majority of surveyed residents with a score indicating the presence of (at least) a moderate degree of depression were in R_V (30.36%), slightly less in $R_{šWS}$ (27.86%) and R_{SES} (26.42%), and the least in R_B (15.36%). Those differences in frequency distributions are statistically significant ($\chi^2(6, N = 13{,}178) = .60$, $p < .001$). R_V not only had the largest number of people whose depression reached a significant level (PHQ-8 ≥ 10 ≤ 24), but R_V also registered the highest level of depression in the examined sample. The post-hoc analysis indicates that significantly higher depression scores measured by the PHQ-8 ($M = 1.28$, $SD = 2.99$) were obtained in the R_V compared to the remaining three regions ($t(28) = 2.6$, $p < .05$). The R_{SES} ($M = 1.40$, $SD = 2.95$) came next, with values that were significantly higher than the R_B ($M = 0.78$, $SD = 2.21$) and $R_{šWS}$ ($M = 1.14$, $SD = 2.47$).

The territorial distribution of specialists in psychiatry and neuropsychiatry differs from the distribution of registered cases. Thus, as many as 245 (33.89%) psychiatrists were allocated to R_B, 174 (24.07%) to R_{SES}, and 172 (23.79%) to R_V. $R_{šWS}$ hired the fewest psychiatric and neuropsychiatric specialists (132, or 18.26%). The difference between $R_{šWS}$ and R_{SES} reflects the decrease in the number of neuropsychiatry specialists, while the number of psychiatrists in these two regions was equal. Residents in R_B, R_V, and R_{SES} report more frequently about the geographical and financial inaccessibility of general HC services than residents of $R_{šVS}$, according to a 2019 population health survey. Residents of R_B were most dissatisfied with the distance of HC services or traffic, i.e., transportation problems, and residents of R_{SES} with the financial aspects of services.

In light of the workload of (neuro)psychiatry specialists, it is noted that each of the R_B psychiatrists individually reported approximately 31 diagnoses in patients that they treated diagnostically and therapeutically during 2019. The most unfavorable ratio was obtained for R_V (61) and $R_{šWS}$ (59), followed by R_{SES} (37). When it comes to the use of psychiatrist services, regardless of the reason, approximately every 6th patient reached a psychiatrist in R_B, every 5th in R_V, every 9th in R_{SES}, and every 10th in $R_{šWS}$. This does not mean that psychiatrists refused patients or were unavailable.

Regarding depression, the approximate workload of psychiatrists can be expressed according to the number of patients who declared that they experienced “some form of depression” during the last year or based on objective indicators, i.e., assessment through the PHQ-8 questionnaire. In the first case, every 2nd (neuro)psychiatry specialist in R_B hypothetically treated one patient from the

region who declared that he had experienced "some form of depression" during the previous year. In the remaining regions, a ratio of 1 patient with indicators of a significant level of depression: 1 specialist was obtained. Thus, the ratio is the most unfavourable in $R_{ŠWS}$, followed immediately by R_{SES}. In the second case, based on the PHQ-8 questionnaire, every 6th patient will turn to a psychiatrist in R_B, and almost every 2nd will seek help in the remaining three regions. Based on the population of people over 15 years old, the average psychiatrist-to-patient ratio is 1.23 in the $R_{ŠWS}$, 0.94 in the R_V, 0.72 in the R_{SES}, and 0.58 in the R_B region (represented per 100,000 inhabitants).

4.3 The group of "F diagnoses" represented in hospitalized patients for the period 2015–2020: The dynamic of change

Analysis of the hospitalized patients' number according to MH problems groups of diagnoses indicates a changing dynamic, especially during the first two years of the COVID-19 pandemic (Table 3).

Table 3: The hospitalized patients' frequency by a group of diagnoses for the period 2015–2020

Groups*	Values	2015	2016	2017	2018	2019	2020
F00-F03	N	1,257	1,273	1,228	1,353	1,357	1,763
	%	3.39%	3.53%	3.51%	4.07%	4.16%	5.73%
	$Index_{Ch}$	–	101%	96%	110%	100%	130%
F04-F09	N	2,838	2,614	2,498	2,179	2,293	1,454
	%	7.65%	7.24%	7.14%	6.56%	7.02%	4.73%
	$Index_{Ch}$	–	92%	96%	87%	105%	63%
F10	N	4,771	5,142	4,851	4,663	4,460	3,834
	%	12.86%	14.24%	13.86%	14.04%	13.66%	12.47%
	$Index_{Ch}$	–	108%	94%	96%	96%	86%
F11-F19	N	2.321	2.335	2.354	2.387	1.613	2.148
	%	6.26%	6.47%	6.73%	7.19%	4.94%	6.99%
	$Index_{Ch}$	–	101%	101%	101%	68%	133%
F20-F29	N	9,831	9,646	9,811	9,299	9,708	11,574
	%	26.50%	26.71%	28.04%	27.99%	29.74%	37.64%
	$Index_{Ch}$	–	98%	102%	95%	104%	119%
F30-F39	N	9,170	8,522	7,576	7,135	7,200	5,200
	%	24.72%	23.60%	21.65%	21.48%	22.05%	16.91%
	$Index_{Ch}$	–	93%	89%	94%	101%	72%
F40-F49	N	2.549	2.363	2.269	2.210	2.299	1.796
	%	6.87%	6.54%	6.48%	6.65%	7.04%	5.84%
	$Index_{Ch}$	–	93%	96%	97%	104%	78%
F50-F59	N	204	152	166	139	179	91
	%	0.55%	0.42%	0.47%	0.42%	0.55%	0.30%
	$Index_{Ch}$	–	75%	109%	84%	129%	51%
F60-F69	N	1,414	1,383	1,491	1,265	1,086	945
	%	3.81%	3.83%	4.26%	3.81%	3.33%	3.07%
	$Index_{Ch}$	–	98%	108%	85%	86%	87%

Groups*	Values	2015	2016	2017	2018	2019	2020
F70-F79	N	1,051	855	807	774	753	704
	%	2.83%	2.37%	2.31%	2.33%	2.31%	2.29%
	$Index_{Ch}$	–	81%	94%	96%	97%	93%
F80-F89	N	980	1,130	1,293	1,219	968	791
	%	2.64%	3.13%	3.70%	3.67%	2.96%	2.57%
	$Index_{Ch}$	–	115%	114%	94%	79%	82%
F90-F99	N	714	698	649	595	732	447
	%	1.92%	1.93%	1.85%	1.79%	2.24%	1.45%
	$Index_{Ch}$	–	98%	93%	92%	123%	61%
Total	N	37,100	36,113	34,993	33,218	32,648	30,747
	%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	$Index_{Ch}$**	–	97%	97%	95%	98%	94%

* F01-F09, Mental disorders due to known physiological conditions; F10-F19, Mental and behavioral disorders due to psychoactive substance use; F20-F29, Schizophrenia, schizotypal, delusional, and other non-mood psychotic disorders; F30-F39, Mood (affective) disorders; F40-F48, Anxiety, dissociative, stress-related, somatoform and other nonpsychotic mental disorders; F50-F59, Behavioral syndromes associated with physiological disturbances and physical factors; F60-F69, Disorders of adult personality and behavior; F70-F79, Intellectual disabilities; F80-F89, Pervasive and specific developmental disorders; F90-F98, Behavioral and emotional disorders with onset usually occurring in childhood and adolescence; F90-F99, Unspecified mental disorder.
**$Index_{Ch}$ = Chain Index

The data indicate that the most frequent in the system are persons with manifestations from the spectrum of schizophrenia, schizotypal, delusional, and other non-mood psychotic disorders, mood (affective) disorders, and mental and behavioural disorders due to the use of alcohol. As observed by groups, with time and especially during the first and second annual pandemics, there is an increase in the number of people treated for 1) dementia; 2) mental and behavioural disorders due to the use of opioids; and 3) conditions from the schizophrenic spectrum. The biggest decrease was observed in 1) behavioural syndromes associated with physiological disturbances and physical factors (e.g. eating disorders); 2) behavioural and emotional disorders with onset usually occurring in childhood and adolescence; 3) the rest of disorders from category mental disorders due to known physiological conditions (F04-F09); and 4) mood (affective) disorders. Actually, in those groups, there was a sudden jump in the number of treated cases during the first year of the COVID-19 pandemic (2019). The decline in the representation of these patients in the HC system occurred during the second year of the pandemic, i.e. in 2020.

5 Discussion

Our research shows significant differences in patient loading and employed psychiatrist numbers in administrative districts. In the Region of Vojvodina (R_V) and Region of Southern and Eastern Serbia, the ratio of the number of employed

psychiatrists and patients is the most unfavorable, according to several criteria: the number of inhabitants, the number of examinations performed, and the number of depressed persons determined by a population study, and this is when both subjective experience and objective measures of depression are observed. Additionally, the R_V residents more frequently report issues with the financial and spatial accessibility of healthcare services, suggesting a shortage of psychiatrists. As a result of overburdening and various degrees of effort for the same income, professionals may become dissatisfied. It is crucial to note that the psychiatrists' workload based on this population health study differs from the predictions based on Census data. Of course, variables influencing a person's decision to seek therapy from a psychiatrist include the distance from their surroundings, the quality of healthcare facilities, trust in treatment, and referrals from formal and informal sources. Furthermore, the first CMHC was established in the southern and eastern regions of RS during the initial stages of healthcare reform.

The performance indicator variance analysis as a strategy for optimizing the number of employees can be an effective tool for rethinking the burden of mental health experts (Čudanov, Sanovan Jaško, & Slović, 2020). Service dynamics analysis (2016–2020) suggests including various MH problems in national health surveys for a holistic view, despite challenges. First, the epidemiology of mental health disorders is a shifting picture influenced by sociological, cultural, political, and economic factors. Second, any selection principle can cause crucial facts to be overlooked. In our analyses, there was a sudden increase in the number of people treated for dementia or conditions from the schizophrenic spectrum during the COVID-19 pandemic, about which there is no clear data in the relevant literature.

The Plan of the Network of the HCF currently focuses on the number of provided mental health services by the system (e.g., number of hospitalizations, beds, discharges...) The proposal suggests basing healthcare planning on the number of mental health services provided by individual practitioners. However, issues arise regarding service quality/quantity ratio, competitive work climate, and increased risk of burnout syndrome. Additionally, some medical services may not be adequately represented in actual Information and Communication Technology (ICT) services. When considering redesigning existing ICT services, numerous factors must be considered. It takes time to develop new ICT applications (Čudanov, Jaško, & Jevtić, 2009). ICT does not direct an organization toward more or less decentralization. It instead broadens the options for tailoring the decentralization level to other internal or external organizational parameters. Regarding ICT adoption, institutions and organizations with a strong focus on results outperform those with a focus on people (Čudanov & Jaško, 2012).

The transition of the healthcare system from decentralization to centralization can be very chalenging. A detailed explanation of this dynamic and complex process

in selected European countries can be found in the monograph *Local Self-Government in Europe*, edited by Brezovnik, Hoffman, & Kostrubiec (2021). For instance, in some Eastern European countries (e.g. Romania, Bulgaria, and Hungary), the transition from decades of strictly centralized regimes has been accompanied by a shift toward decentralization, which remains an ongoing process. A moderate to notable level of decentralization is evident in countries with a high Human Development Index and strong welfare systems (e.g. Scandinavian countries and Italy). In economically more developed parts of Europe (e.g. Lithuania and Spain) now operate decentralized healthcare systems.

The anticipated benefits of the reforms sometimes may only be partially realized, often accompanied by unforeseen or even negative consequences. Notably, a significant part of Europe is returning to centralization, particularly during times of crisis. Actually, many European countries now streaming again toward centralization.). Namely, despite its potential benefits, decentralization has introduced some obstacles (Brezovnik, Hoffman, & Kostrubiec, 2021). Under decentralization, local governments became responsible for financial and organizational self-sustainability. Thus, it is not surprising that the social crises in Europe are causing the centralization of existing systems. It is important to bear in mind that decentralization, even at the micro level (e.g., companies), is not a discrete, but continuous process, and that authority migrates slowly to organizational units where information is concentrated (Čudanov et al., 2009). The process of authority migration is often informal in nature at the beginning, the superior still keeps the right to sign formal decisions and documents, but a lower-level employee with necessary information makes the decision.

Local communities are capable of self-government, but they need support regarding organizational, technical, and personnel development (Komazec, Todorović, Krivokapić, & Jaško, 2013). They cannot carry on the burden alone. But, doing alone is not the meaning of decentralization. The point is the balance between centralization and decentralization organizational principles.

6 Conclusions

The ongoing mental health care (MHC) reform in Serbia, two decades in, is due to the complex transition from socialism to a “welfare state.” The core principle is a balance between centralization and decentralization, with Community Mental Health Centers (CHMC) as its cornerstone. The Action Plan for the implementation of The MH Protection Program in the RS for 2019–2026 (The 2019–2026 Action Plan) highlights the need for a comprehensive CMHC network close to residents living areas. Unifying and centralizing MHC data collection while decentralizing the system is essential. The 2019–2026 Action Plan aims to establish an information system and a register for specific mental disorders,

including procedures and software. This research emphasizes rethinking mental health parameter registration for optimal CMHC coverage. Key recommendations include data collection unification, a central database, and comprehensive mental health problem records. Preserving the link between user socio-demographic data and services aids personalized access and precise user movement analysis across healthcare levels. This is crucial for system organization, especially for the national Network Plan of the Health Care Facilities redefinition. Data confidentiality and anonymization principles should be redefined under these circumstances.

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Notes:

[1] Serbia's administrative districts (Serbian: Upravni okrug) are the country's first-level administrative divisions. They are regional administrative centers through which the central government exercises jurisdiction in a hierarchical order. They have an important role in the decentralization of state administration and can perform state administration tasks such as: resolving administrative matters in the first instance or on appeals, supervising the work of public authority holders, and performing inspection supervision. The District Establishment Decree was issued in 1992, but there have been notable alterations in population density and infrastructure of MHC institutions in districts since then.

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