

Research paper

Changes in national rates of psychiatric beds and incarceration in Central Eastern Europe and Central Asia from 1990-2019: A retrospective database analysis

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ABSTRACT

Background: Numbers of psychiatric beds (general, forensic, and residential) and prison populations have been considered to be indicators of institutionalisation of people with mental illnesses. The present study

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aimed to assess changes of those indicators across Central Eastern Europe and Central Asia (CEECA) over the last three decades to capture how care has developed during that historical period.

Methods: We retrospectively obtained data on numbers of psychiatric beds and prison populations from 30 countries in CEECA between 1990 and 2019. We calculated the median of the percent changes between the first and last available data points for all CEECA and for groups of countries based on former political alliances and income levels.

Findings: Primary national data were retrieved from 25 out of 30 countries. Data from international registries were used for the remaining five countries. For all of CEECA, the median decrease of the general psychiatric bed rates was 33•8% between 1990 and 2019. Median increases were observed for forensic psychiatric beds (24•7%), residential facility beds (12•0%), and for prison populations (36•0%). Greater reductions of rates of psychiatric beds were observed in countries with lower per capita income as well as in countries that were formerly part of the Soviet Union. Seventeen out of 30 countries showed inverse trends for general psychiatric beds and prison populations over time, indicating a possible shift of institutionalisation towards correctional settings.

Interpretation: Most countries had decreased rates of general psychiatric beds, while there was an increase of forensic capacities. There was an increase in incarceration rates in a majority of countries. The large variation of changes underlines the need for policies that are informed by data and by comparisons across countries.

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1. Introduction

Central and Eastern Europe and Central Asia (CEECA) is a collection of 30 countries that have relevant economic, healthcare, political, and historical commonalities in the post-World War II period that merit consideration as a single geographic region. In health systems research, this region has also been referred to as Central Eastern Europe – Commonwealth of Independent States (CEE-CIS). The burden of mental and substance use disorders in CEECA is one of the highest in the world [1], with medium to high suicide rates [2,3], and an excess of alcohol [4] and illicit drug use disorders [5]. Additionally, older adults in Central and Eastern Europe have a higher prevalence of depressive symptoms and lower cognitive functions when compared to their counterparts in Western Europe and Scandinavia [6,7]. Political, economic, and social changes within CEECA have also given rise to transitions related to crime [8]—e.g., doubling of homicide rates in Russia in the 1990s—which contribute to sustained high incarceration rates [9]. Although some of countries in CEECA have shown substantial decreases in prison population rates in the last few years, 22 out of 30 exceed the world average (145 prisoners per 100 000 population) [10].

Incarceration rates may also be considered as an indicator of institutionalization of mentally ill people, since mental health and substance use disorders are highly prevalent in prison populations worldwide [11–15]. They remain underestimated and undertreated, especially in low-income and middle-income countries (LMICs) [16,17]. Chronic infectious diseases [18] and injectable opioids addiction are further important health concerns in CEECA prisons [9]. Many individuals experience recurrent psychiatric hospitalizations and incarcerations over time—the so called revolving door phenomenon [19–21]. Repeated episodes of inpatient treatment and imprisonment have been reported for people with severe mental illness, comorbid substance use and personality disorders [22]. In 1939, Penrose described for the first time a possible inverse relationship between the number of psychiatric beds and the size of prison populations, based on a cross-sectional analysis of data from 18 European countries [23]. This was addressed in a review including 21 publications between

1973 and 2015, of which, a majority supported the Penrose Hypothesis [24]. Although most studies in the review were from high-income countries (HICs) [25–31], and only a few studies have been conducted analyzing data from LMICs [26,32,33], the strongest evidence for an inverse relationship between the rates of psychiatric beds and incarceration rates was reported in Latin America [34]. The Penrose Hypothesis was partially supported by a study of 12 CEECA countries which showed decreasing trends for psychiatric bed rates in all countries between 1990 and 2009, and an increase in prison populations in half of the countries [33]. However, in Europe between 1993 and 2011, the effects of decreasing the number of psychiatric beds on prison populations were heterogeneous [25]. Since 1939, the populations in need of mental health beds may have shifted from those with chronic psychosis to people with substance use or dual disorders, depending on the region and advances in community psychiatry.

Until the dissolution of the Soviet Union in 1991, the mental health care system was linked with the political system in CEECA, and was almost exclusively based in large psychiatric hospitals [35–37]. People with substance use disorders were registered, which implied that treatments or imprisonment could be enforced [38]. Since then, the region has experienced developments in community and social psychiatry, human rights, stigma reduction, and mental health policies [39]. However, in a scoping review published in 2017, Central and Eastern Europe was considered a blind spot on the global mental health map [39], with services still predominantly based in psychiatric hospitals. In some countries, a substantial decrease in the number of general psychiatric hospital beds has been reported alongside an increase in supported housing capacities and forensic psychiatric beds [40], as well as increased numbers of social workers and clinical psychologists [41]. In other countries, however, essential psychiatric reforms have only recently been initiated or have yet to take place [42].

To inform further mental health system development and penal justice reforms, the assessment and trends of key indicators of institutionalization needs to be updated and put into a regional context. Therefore, the aim of the present study was to capture changes in rates of psychiatric beds and prison populations in all CEECA countries between 1990 and 2019.

Research in context

Evidence before this study

While decreased numbers of psychiatric beds have been well documented and quantified for a range of high income countries, research from Central and Eastern Europe and Central Asia (CEECA; a grouping of 30 countries) is scarce. We conducted a search on PubMed using the term “psychiatric hospital beds”, from database inception up to April 28, 2019, with no language restrictions. The result was a total of 1041 publications, of which, 333 reported (296 on a national level) bed numbers, bed capacities, occupancies, or correlations to deinstitutionalization. 203 studies reported data from European countries and 41 included low-income or middle-income countries. In addition, 144 articles were viewpoints, expert opinions and comments, or statistical models with recommendations for policies and planning of psychiatric services. Two studies quantified psychiatric bed removal in CEECA. The decrease in psychiatric beds was associated with increasing prison population rates in several studies. One study reported rates of psychiatric and forensic psychiatric hospital beds, rates of beds in supported housing facilities, and incarceration rates in 12 CEECA countries between 1990 and 2009. While all of the 12 countries reported a decrease in the rate of psychiatric beds, half of the countries also reported increased prison population rates. A second study quantified reduction in psychiatric beds in nine Eastern European countries between 1993 and 2011, of which, six reported increased prison populations in the same time period.

Added value of this study

This is an international collaborative work that compiles and quantifies data on general psychiatric, forensic and residential psychiatric beds and incarceration rates across 30 countries in CEECA. Most of these data were previously unpublished and not easily available and they will now be generally available. This contributes to promoting public health equity and will provide international perspectives for policy making within the CEECA region and worldwide. The participation in co-authorship of local researchers from 25 out of 30 included countries (most of them low- and middle-income economies) is especially relevant and reflects a diversity of professional background, gender, and geography.

Implications of all the available evidence

The large variation of changes across CEECA countries suggests that comparisons of policies and data across countries in a similar context may be a useful step towards developing appropriate policies. There is a need for policies informed by data given the high costs of institutional care. Policies should define targets for psychiatric bed rates to meet service needs in acute care and for residential bed rates to meet long-term care needs in the community. The increasing incarceration rates in a majority of the CEECA countries give rise to concern about institutionalization of individuals with mental health problems in correctional settings. Standardized data collection methods across countries and storage in unified data repositories could facilitate future comparative research.

2. Methods

2.1. Definition of indicators

We assessed four different indicators: (1) Psychiatric beds defined as any bed in hospital settings assigned to mental health treatment in psychiatric hospitals or in psychiatric units of general hospitals. This included beds specifically assigned to child and adolescent psychiatric care. (2) Forensic psychiatric beds included any bed reserved for the evaluation or treatment in forensic psychiatry ordered by courts of law. (3) Beds in residential or housing facilities for mentally ill people including non-hospital community-based mental health facilities that provide overnight residence, usually serving users with relatively stable mental disorders not requiring intensive medical interventions [43]. These facilities usually serve a variety of functions, and therefore, there was a variation in the terminology used for them [43–45]. We excluded facilities exclusively offering treatment for people with substance use disorders or intellectual disability, and generic facilities not intended to meet mental health needs (e.g., nursing and rest homes for elderly people, institutions treating neurological disorders or physical disability) [43]. (4) Prison populations were defined as all individuals confined day and night in jails or prison facilities as pre-trial detainees or convicted offenders.

2.2. Data sources

We contacted potential collaborators based on previous partnerships, scientific literature, snowballing, and personal contacts between May 24, and November 6, 2019. We also contacted Ministries of Health or related government institutions in countries where no collaborator could be engaged. A standardized template was used to collect data from every year for the time span between 1990 and 2019. Between May 29, 2019 and July 21, 2020, the data were collected by participating collaborators in the respective countries. When data from primary and secondary national sources were unavailable, data were retrieved from a previous study [33], from the European Health Information Gateway [46], and from the World Prison Brief online database [47]. Population counts, per capita gross national income (GNI), based on purchasing power parity in US dollars, and the Gini index, a measure of income inequality within a country, were retrieved from the World Bank [48]. Only for Ukraine in 2019, we used national population estimates excluding the occupied territories [49]. Although several countries in CEECA currently qualify as HIC, all of them were LMICs in 1990, the beginning of the observation period in this study.

2.3. Statistical analysis

Rates were calculated as the number of beds in the different types of institutions per 100 000 population. We calculated the percentage changes of beds in psychiatric facilities and prison populations between the first and last available data points, and calculated the median and mean values with interquartile range, and 95% confidence intervals of the means for these data points. In order to present a descriptive analysis of the percentage changes, we calculated the median and mean values and the 95% confidence intervals of the means for percentage changes. Additionally, changes in absolute numbers of psychiatric beds and prison populations were calculated for all countries to estimate absolute changes in the region since 1990. Furthermore, we compared median and mean values for a priori defined groups by income level at the last data point and former

political alliances (i.e., formerly part of the Soviet Union countries, or formerly part of Yugoslavia) and calculated percentage changes for the median and mean values over time. In regard to the Penrose Hypothesis, we compared a priori defined groups by their trends. Countries with decreasing rates of psychiatric beds and prison populations were compared to countries with inverse trends (decreasing rates of psychiatric beds and increasing rates of prison populations, in line with the Penrose Hypothesis). Findings from group comparisons were presented using descriptive analyses. We calculated interpolated mean rates for psychiatric beds and prison populations from the year 2000 onwards, when datasets for those indicators were most complete. Linear trend lines for both indicators and respective coefficients of determination were calculated. We compared findings for CEECA with countries forming part of the Organization for Economic Cooperation and Development (OECD) to put regional data in the context of current developments in high-income economies, for which data are publicly available. The OECD is an international organization of 37 countries, most of which are high-income economies. Numbers of psychiatric beds for OECD countries were retrieved from www.stats.oecd.org. Prison population rates of the OECD countries were retrieved from the Institute of Criminal Policy Research (www.prisonstudies.org) [47]. The Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia and Turkey form part of CEECA and the OECD.

2.4. Role of the funding source

The funder financed research assistance to coordinate the research network and data collection. The funding agency had no influence in the design of this study or in the analysis and interpretation of the data, nor in the writing or the decision to submit this article for publication.

3. Results

Primary data on rates of psychiatric beds and prison population were retrieved from 25 out of 30 countries in CEECA (Table 1). In the remaining five countries (Armenia, Lithuania, North Macedonia, Turkey, and Uzbekistan), we contacted at least one researcher, who either did not sustain contact or was unable to obtain the data. In these cases, data were retrieved from secondary sources. As of 2019, the populations of the participating countries amounted to more than 485 million inhabitants, of which the Russian Federation accounted for 30%. 15 of the countries were former Soviet republics and seven were formerly part of Yugoslavia. Data on specialized forensic beds were obtained in 18 countries and on residential/housing facilities in 13 countries. For these two indicators, data were typically not available for the entire 1990–2019 period.

All countries included in this study were middle-income economies in the early 1990s. Belarus (upper middle), Kyrgyz Republic, Moldova, Ukraine, and Uzbekistan (lower middle) remained in the same income group from 1990 to 2019, and Tajikistan changed from lower middle-income to low-income level. The income group level of all other countries has increased, resulting in 10 (33%) countries that had high-income economies by 2019. A list of the 30 CEECAC and the respective income group to which they belonged at the first and last data point, per capita GNI and Gini index are provided in the supplement (Supplement, Table 1).

3.1. Psychiatric beds

29 out of 30 countries reported decreased rates of psychiatric bed at the last data time point compared with the first (Fig. 1). Median percentage change was a decrease of 34% (30 fewer beds per 100 000 population), ranging from an increase in Kosovo (increase of 40%, 3.7 more beds per 100 000 population) to the greatest decrease in

Tajikistan (decrease of 77%, 54 fewer beds per 100 000 population). Despite the increased rate in Kosovo, both Tajikistan and Kosovo, alongside with Belarus and Turkey, reported the lowest psychiatric bed rates: all below 20 beds per 100 000 population. The highest rates within the region were reported in Latvia, Lithuania, the Czech Republic, Croatia, and the Russian Federation: all above 90 beds per 100 000 population (Table 1).

A total number of 444 737 psychiatric beds were reported in CEECA at the first data time point, and 279 739 remained at the last available data time point, indicating a decrease of 167 998 psychiatric beds (decrease of 37%) for the entire region. Greater decreases of rates of psychiatric beds were reported in countries that were formerly part of the Soviet Union, with more than twice the median percentage change compared to the other CEECA countries (Table 2).

Countries that were in the lower middle-income group in 2019 showed a greater decrease of median rates compared with upper middle-income and high-income economies in the same time period (Table 3).

Numbers of psychiatric beds used in specific subspecialties are reported in supplementary Table 2.

3.2. Prison populations

Rates of prison populations increased in 18 countries, and decreased in 12 countries with a median increase of 36% (50 more prisoners per 100 000 population). This ranged from a decrease of 53% (86 fewer per 100 000 population) in Armenia to an increase of 629% (84 more per 100 000) in Kosovo (Fig. 2). Many countries that were formerly part of the Soviet Union, such as the Kyrgyz Republic, Latvia, Ukraine, and Uzbekistan, showed a decrease of over 35% in prison populations from a high rate at the early time points during the period of observation. The greatest increase was seen in countries formerly part of Yugoslavia (Kosovo, Serbia, Croatia), Albania, the Czech Republic, and Turkey, all of which reported more than 145% increase in rates of prison populations from a low rate at the early time points during the period of observation. The median change in rates of prison populations between first and last data points was a 17% decrease in 15 post-Soviet republics, which contrasts with a 95% increase in all 15 remaining Eastern European countries, and over 115% increase in the seven countries that were formerly part of Yugoslavia. Rates of prison populations were decreased over the period of observation in lower middle-income countries, while they were increased in upper middle-income and high-income countries during the same time period.

3.3. Specialized forensic psychiatric beds

Rates of specialized forensic beds were reported by 18 out of 30 countries (Fig. 3). There was a median 24.7% increase (1.8 more beds per 100 000 population) between the first and last data points for the entire region. For most countries (12 out of 18), we calculated increased rates of forensic beds. Bosnia and Herzegovina, Bulgaria, the Kyrgyz Republic, Romania, and Tajikistan had a decrease in rates, and the Slovak Republic reported no forensic psychiatric beds in the country at any time point in the period of observation (Table 2).

3.4. Places in residential facilities

Rates of beds in residential facilities were reported for only 13 countries (Fig. 4). Although Bulgaria reported a number of residential centers, no data for residential beds or places were available, so it was excluded from the analysis.

Large heterogeneity was seen for this indicator, with four countries (the Slovak Republic, Latvia, Hungary, and Croatia – in order of highest to lowest rate) reporting high rates ranging between 100 and more than 750 places per 100 000 population at the last point of

Table 1

Rates of psychiatric beds, specialized forensic psychiatric beds, places in residential facilities for individuals with mental health problems, and prison populations in 30 Central Eastern European and Central Asian countries.

	Psychiatric beds per 100 000 population				Specialized forensic psychiatric beds per 100 000 population				Beds in residential facilities per 100 000 population				Prison population per 100 000 population			
	Period of observation	First data point	Last data point	Percentage change	Period of observation	Rate at first point	Rate at last point	Percentage change	Period of observation	Rate at first point	Rate at last point	Percentage change	Period of observation	Rate at first point	Rate at last point	Percentage change
Albania	1990-2018	38•6	26•0	-32•7	2004-2019	1•9	9•5	404•8	2002-2019	0•4	4•9	1167	1995-2019	36•5	179•1	390•7
Armenia	1990-2014	61•6	50•4	-18•2	NA	••	••	NA	NA	••	••	NA	1994-2019	163•0	76•6	-53•0
Azerbaijan	1991-2018	73•9	39•2	-46•9	1990-2017	1•0	1•8	86•7	1991-2018	11•1	8•8	-21•0	1997-2018	317•1	234•6	-26•0
Belarus	1990-2013	44•1	18•0	-59•2	NA	••	••	NA	NA	••	••	NA	1990-2018	240•6	342•4	42•3
Bosnia-Herzegovina	1992-2018	66•7	35•7	-46•4	1992-2018	14•2	6•0	-57•7	NA	••	••	NA	1998-2014	41•4	76•5	84•8
Bulgaria	1990-2016	92•9	56•9	-38•7	1990-2016	0•7	0•3	-59•4	NA	••	••	NA	1990-2014	126•5	108•9	-13•9
Croatia	1997-2017	104•2	94•1	-9•6	1998-2019	7•7	8•8	13•4	2007-2017	89•7	100•4	12•0	1990-2018	31•8	78•0	145•5
Czech Republic	1990-2017	140•4	94•6	-32•6	NA	••	••	NA	NA	••	••	NA	1990-2019	79•7	198•4	149•1
Estonia	1994-2018	108•4	54•3	-49•9	1992-2019	2•0	6•0	207•7	2003-2018	41•2	85•2	106•6	1992-2019	287•5	194•8	-32•3
Georgia	1996-2018	40•5	31•9	-21•3	NA	••	••	NA	1990-2019	0•0	0•0	0•0	1994-2018	152•5	256•6	68•3
Hungary	1990-2017	133•0	87•4	-34•3	1990-2017	1•4	1•9	34•0	1993-2018	206•5	260•0	25•9	1990-2018	118•8	177•2	49•2
Kazakhstan	1990-2018	90•8	44•1	-51•4	NA	••	••	NA	NA	••	••	NA	1990-2019	338•6	211•8	-37•4
Kosovo	1990-2019	9•2	12•9	39•9	1990-2019	0•2	2•0	1017	1990-2019	16•1	13•7	-15•3	2000-2019	13•4	97•3	628•5
Kyrgyz Republic	1990-2018	87•8	24•6	-72•0	1995-2018	2•3	1•6	-31•3	NA	••	••	NA	1990-2018	195•9	112•4	-42•7
Latvia	1990-2018	260•4	122•5	-53•0	NA	••	••	NA	1995-2018	430•7	673•3	56•3	1990-2018	327•7	182•8	-44•2
Lithuania	1990-2014	164•8	107•9	-34•5	NA	••	••	NA	NA	••	••	NA	1990-2018	232•2	235•5	1•4
Moldova	1990-2018	146•4	38•3	-73•9	2004-2018	3•4	4•0	15•4	2014-2018	1•5	1•9	26•3	1991-2018	253•6	226•7	-10•6
Montenegro	1990-2014	63•7	49•4	-22•4	1990-2019	0•0	3•4	NA	1990-2019	0•0	0•0	0•0	2000-2016	109•8	180•5	64•4
North Macedonia	1990-2013	81•4	54•3	-33•2	NA	••	••	NA	NA	••	••	NA	1990-2019	78•6	90•2	14•7
Poland	1990-2018	96•0	64•0	-33•3	2001-2018	3•9	6•9	77•2	NA	••	••	NA	1990-2018	131•6	190•1	44•4
Romania	1990-2018	95•4	80•4	-15•7	2010-2018	4•8	6•5	36•3	NA	••	••	NA	1990-2018	112•1	106•8	-4•8
Russian Federation	1992-2017	129•2	90•9	-29•7	1992-2017	4•6	4•7	1•1	NA	••	••	NA	1990-2017	471•3	435•9	-7•5
Serbia	1990-2019	77•8	71•6	-7•9	1990-2018	5•3	7•9	49•5	1990-2019	0•0	0•0	0•0	1990-2018	47•8	155•7	226•1
Slovak Republic	2006-2017	84•0	81•5	-3•0	1990-2019	0•0	0•0	0•0	2005-2017	545•6	753•6	38•1	1990-2018	86•6	189•0	118•1
Slovenia	1990-2018	80•8	65•8	-18•5	1990-2018	0•0	2•3	NA	2009-2018	11•6	11•0	-5•1	1990-2018	41•9	65•5	56•1
Tajikistan	1990-2019	70•1	16•1	-77•0	1990-2019	0•9	0•3	-71•7	NA	••	••	NA	1993-2010	75•1	123•8	64•7
Turkey	2000-2014	5•7	5•5	-4•0	NA	••	••	NA	NA	••	••	NA	1990-2019	84•6	342•8	305•3
Turkmenistan	1990-2017	76•7	27•9	-63•6	NA	••	••	NA	NA	••	••	NA	1998-2017	407•8	528•9	29•7
Ukraine	1990-2019	134•4	73•1*	-45•6	NA	••	••	NA	NA	••	••	NA	1990-2019	224•3	141•8*	-36•8
Uzbekistan	1990-2014	60•0	24•3	-59•5	NA	••	••	NA	NA	••	••	NA	1996-2014	258•3	142•7	-44•8
Median		82•7	52•4	-33•8		1•9	3•7	24•7		11•6	11•0	12•0		129•1	179•8	36•0
IQR		42•9	49•7	31•8		3•7	4•6	87•4		89•3	98•5	38•1		171•4	113•2	103•7
Mean		90•6	54•8	-34•9		3•0	4•1	107•7		104•2	147•1	107•0		169•6	189•4	71•0
Upper 95% CI		108•3	65•8	-26•0		4•6	5•5	232•1		202•8	289•6	281•1		213•0	227•8	124•2
Lower 95% CI		72•9	43•8	-43•8		1•4	2•7	-16•7		5•6	4•6	-67•1		126•2	151•0	17•8
Absolute numbers (thousands)		444•7	279•7	-37•1		11•4	12•9	12•7		69•8	85•8	23•0		1,225	1,363	11•3
Total population (millions)		474•2	486•6	2•6		272•9	276•4	1•3		54•7	54•1	-1•1		468•1	491•4	5•0
Number of countries		30	30			18	18			13	13			30	30	

NA. not applicable. IQR. Interquartile range; CI. Confidence interval of the mean.

* Rates of psychiatric beds and prisoner populations excluded the occupied territories for the year 2019.

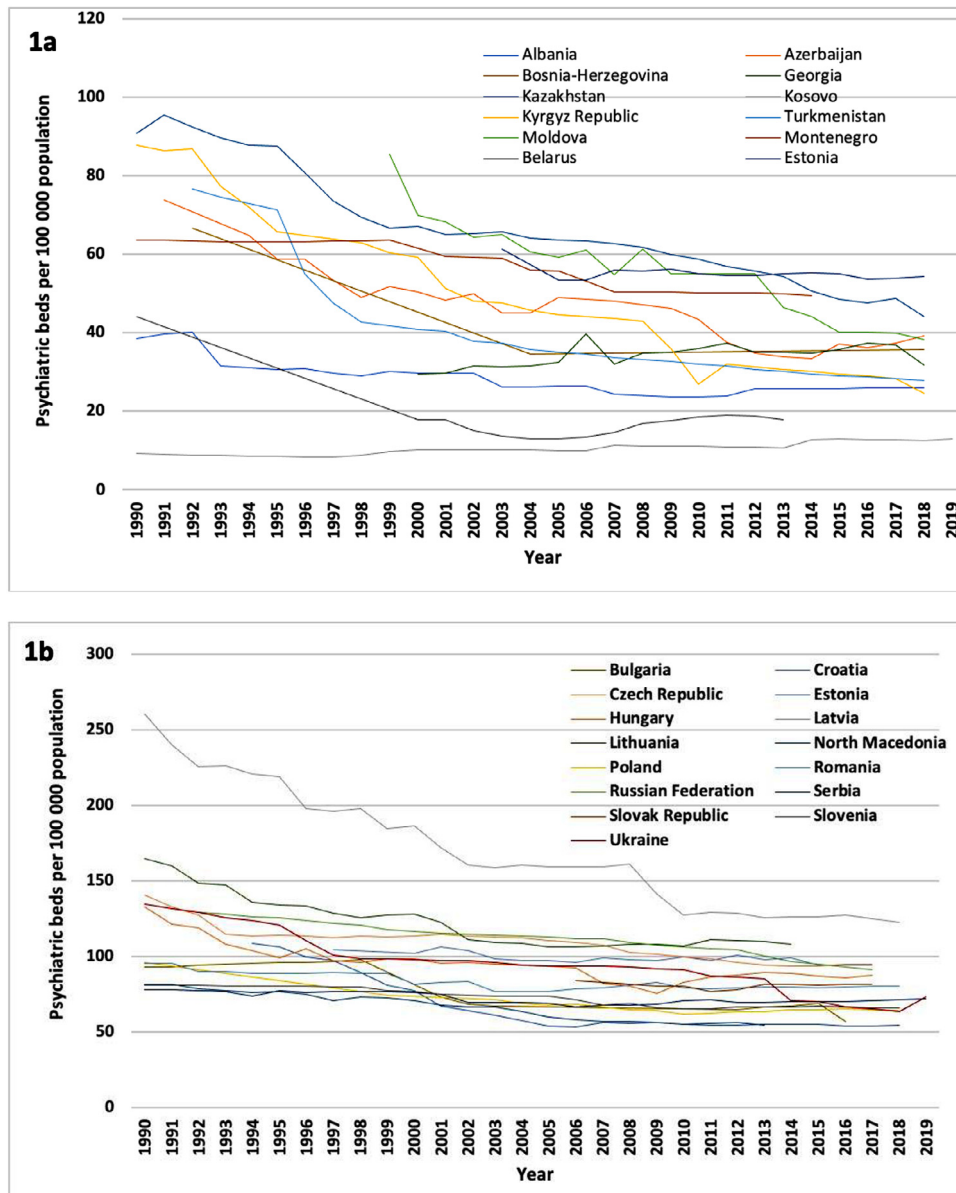


Fig. 1. Rates of psychiatric beds per 100 000 population (1990-2019). a) Countries with rates lower than 54 per 100 000 population (at the last data point); b) Countries with rates higher than 54 per 100 000 population (at the last data point).

observation. The remaining nine countries provided between zero (Georgia, Montenegro, and Serbia) and 85 (Estonia) places per 100 000 population at the last point of observation. Seven countries (Albania, Croatia, Estonia, Hungary, Latvia, Moldova, and the Slovak Republic) reported increasing rates of beds in residential facilities, and three (Azerbaijan, Kosovo and Slovenia) reported decreasing rates over the period of observation (Table 2). Georgia and Serbia did not provide any places in residential facilities over the entire time span. Data on psychiatric residential beds were mainly reported by high-income countries. In most middle-income countries, data were unavailable.

3.5. Penrose hypothesis

Seventeen out of 30 countries (Albania, Belarus, Bosnia and Herzegovina, Croatia, the Czech Republic, Georgia, Hungary, Lithuania, Montenegro, North Macedonia, Poland, Serbia, the Slovak Republic, Slovenia, Tajikistan, Turkey, and Turkmenistan) showed an inverse

trend between rates of psychiatric beds and rates of prison populations in support of the Penrose Hypothesis: while rates of psychiatric beds decreased, the rates of individuals in prisons increased. Within CEECA, none of the countries had inversely increasing rates psychiatric beds and decreasing prison populations.

Twelve countries (Armenia, Azerbaijan, Bulgaria, Estonia, Kazakhstan, the Kyrgyz Republic, Latvia, Moldova, Romania, Russian Federation, Ukraine, and Uzbekistan) reported decreases in both psychiatric bed rates and prison population rates. Kosovo was the only country with increasing rates of both indicators.

Comparisons between the group of countries with inverse trends between indicators (psychiatric beds and prison populations) and the group with decreasing trends of indicators are shown in Table 4. Countries with decreasing trends had the highest rates of prisoners at beginning of the observation period. Most of those countries were formerly part of the Soviet Union, which had very high prison population rates at the time of dissolution. Neither the GNI or Gini index substantially differed between these groups.

Table 2
Rates of psychiatric beds, specialized forensic psychiatric beds, residential places, and prison populations in countries formerly part of the Soviet Union or formerly part of Yugoslavia, and the remaining Central Eastern European countries.

	Psychiatric beds per 100 000 population			Specialized forensic beds per 100 000 population			Beds in residential facilities per 100 000 population			Prison population per 100 000 population		
	First data point	Last data point	Percentage change	Rate at first point	Rate at last point	Percentage change	Rate at first point	Rate at last point	Percentage change	Rate at first point	Rate at last point	Percentage change
Countries formerly part of Soviet Union*												
Median	87•8	39•2	-55•3	2•1	2•9	36•2	11•1	8•8	-21•0	253•6	211•8	-16•5
Mean values	103•3	50•9	-50•7	2•4	3•1	28•8	96•9	153•8	58•7	263•0	229•8	-12•6
Number of countries	15	15		6	6		5	5		15	15	
Countries formerly part of Yugoslavia**												
Median	77•8	54•3	-30•1	2•7	4•7	72•1	11•6	11•0	-5•1	41•9	90•2	115•0
Mean values	69•1	54•9	-20•6	4•6	5•1	11•0	23•5	25•0	6•5	52•1	106•2	103•9
Number of countries	7	7		6	6		5	5		7	7	
Remaining Central and Eastern European countries***												
Median	81•4	64•0	-21•3	1•6	4•7	185•1	13•9	12•3	-11•0	79•7	155•7	95•5
Mean values	78•0	58•7	-24•7	3•3	4•6	38•6	108•7	143•0	31•5	76•1	149•1	96•0
Number of countries	15	15		12	12		8	8		15	15	

* Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan;

** Bosnia and Herzegovina, Croatia, Kosovo, Montenegro, North Macedonia, Serbia, Slovenia;

*** Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Hungary, Kosovo, Montenegro, North Macedonia, Poland, Romania, Serbia, Slovak Republic, Slovenia, Turkey.

Table 3
Median rates of psychiatric beds, specialized forensic psychiatric beds, places in residential facilities for people with mental health problems, and prison populations by income group in 2019 in Central Eastern Europe and Central Asia.

	Psychiatric beds per 100 000 population			Specialized forensic beds per 100 000 population			Beds in residential facilities per 100 000 population			Prison population per 100 000 population		
	First data point	Last data point	Percentage change	Rate at first point	Rate at last point	Percentage change	Rate at first point	Rate at last point	Percentage change	Rate at first point	Rate at last point	Percentage change
Lower middle*	87.8	24.6	-72.0	2.3	1.6	-31.3	NA	NA	NA	224.3	141.8	-36.8
Number of countries	5	5		3	3		1	1		5	5	
Upper middle**	66.7	39.2	-41.2	1.4	4.0	181.5	0.2	2.5	1166.7	126.5	180.5	42.6
Number of countries	15	15		8	8		6	6		15	15	
High***	106.3	84.4	-20.6	2.0	6.0	207.7	148.1	180.2	21.7	115.4	185.9	61.1
Number of countries	10	10		7	7		6	6		10	10	

* Kyrgyz Republic, Moldova, Tajikistan, Ukraine, Uzbekistan;

** Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Georgia, Kazakhstan, Kosovo, Montenegro, North Macedonia, Russian Federation, Serbia, Turkey; Turkmenistan;

*** Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland Romania, Slovak Republic, Slovenia.

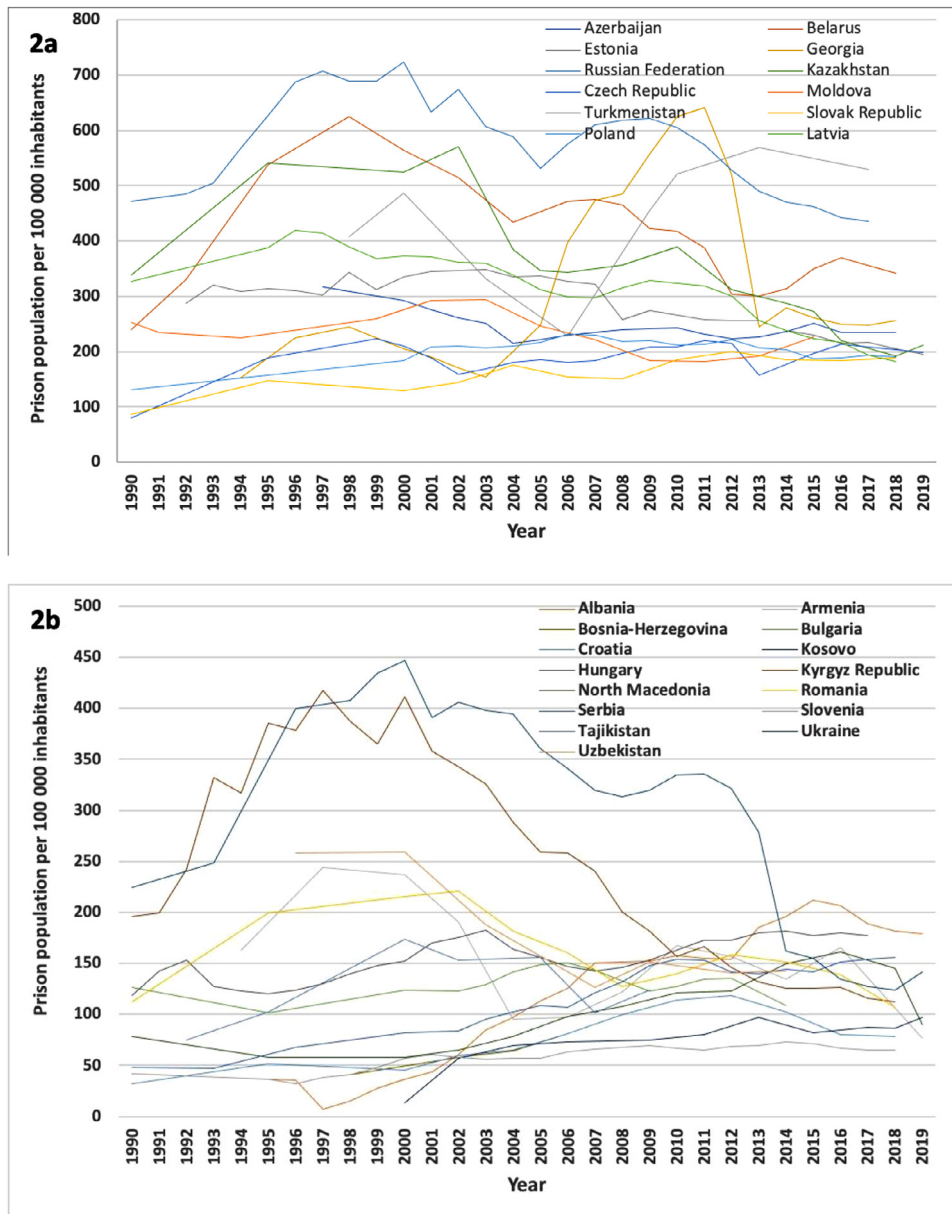


Fig. 2. Rates of prison populations per 100 000 inhabitants (1990–2019). a) Countries with rates higher than 180 per 100 000 population at the last data point; b) Countries with rates lower than 180 per 100 000 population at the last data point.

The mean psychiatric bed rates from the year 2000 onwards showed a decreasing trend (slope: -0.79) that was slower than the mean decrease in OECD countries and on a lower level. The mean prison population rates also showed a decreasing trend (slope: -1.89), contrasting the OECD in the same time period that showed on average an increasing trend (Fig. 5). However, prison population rates in CEECA remained on a higher level than in the OECD countries.

4. Discussion

4.1. Main findings

In the period of observation between 1990 and 2019, CEECA underwent major and inconsistent changes in institutionalized care. There was a substantial decrease of rates of psychiatric beds. These decreases were especially pronounced in the lower-middle income economies. Twelve countries of the region reported decreasing trends for both rates of prison populations and psychiatric beds,

whereas 17 countries reported decreased psychiatric bed rates, while prison population rates increased.

4.2. Interpretation

Over three decades following major political changes in the region, a large part of CEECA underwent a sustained process of decreasing the number of psychiatric beds, which was in line with mental health system reforms towards more decentralized outpatient treatments. Median rates across CEECA approached the value of 50 per 100 000 population in 2019, which was estimated as a minimum number for the public mental health care system by the Treatment Advocacy Centre in the US [50], below the average of 71 per 100 000 in OECD countries [51]. However, rates of psychiatric beds in CEECA remained markedly higher than in other LMIC regions, such as Latin America [34]. Increased rates of specialized forensic psychiatric beds and residential facilities for mentally ill individuals was observed in several participating countries. Although the absolute

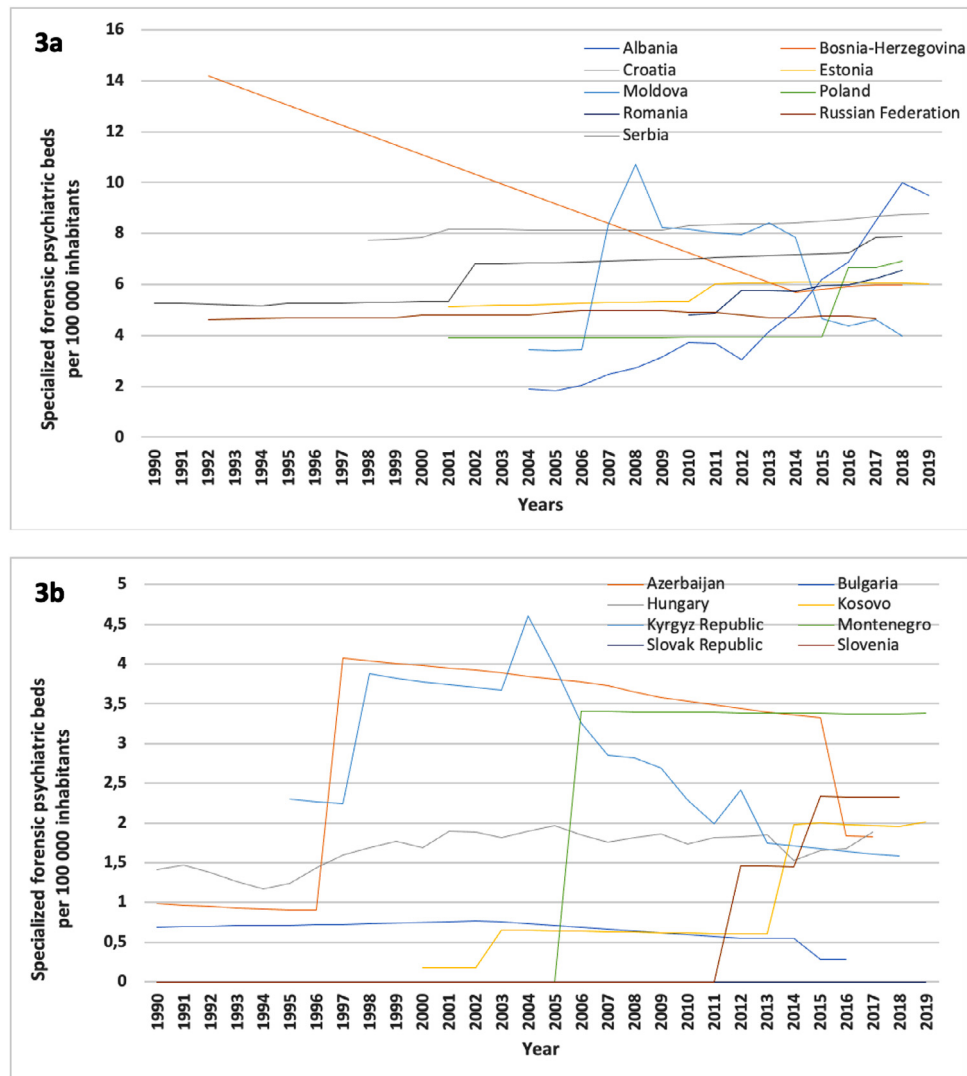


Fig. 3. Numbers of specialized forensic psychiatric beds per 100 000 population (1990–2019). a) Countries with rates 3.9 per 100 000 population or higher at the last data point; b) Countries with rates lower than 3.9 per 100 000 population at the last data point.

numbers of psychiatric beds increased in Turkey, the country exhibited a decreasing trend in rates of psychiatric beds per 100 000 population. Compared to the rest of the region, Turkey had the lowest psychiatric bed rate at the first and the last data points, which were more similar to countries of the eastern Mediterranean region [52,53]. Russia and Turkmenistan reported data for so called narcological beds, which were excluded from psychiatric bed counts, but are mentioned in the supplementary documents (supplementary Table 1). Narcology was a common subspecialty of psychiatry during the Soviet era that dealt with the health of people experiencing alcohol and drug use disorders [54,55].

The legacy of the Gulag which incarcerated up to 2 million people still weakens the trust in correctional institutions of former Soviet countries and has ongoing impact on correctional ethics, social networks, and architectural settings in prisons [56]. After the dissolution of the Soviet Union, prison reforms were introduced to humanize living conditions for incarcerated individuals, and to improve the control over the internal organization [57]. Before the implementation of reforms, prisons were organized by subcultures and hierarchies within the prisoner populations that monitored and controlled the other inmates. However, in some regions, levels of violence within the correctional system even increased during reforms. For example,

Georgia, which had one of the highest incarceration rates globally, noted a significant increase in death rates within prisons in 2010, in line with general disorganization, understaffing, and human rights violations. After public awareness of these issues was raised by the media, Georgian authorities declared mass amnesty and in 2013 more than 50% of the prison population were released [57]. The systematic release of incarcerated people due to presidential clemency was also reported in Turkmenistan [58]. In contrast, Russia had never committed to prison reforms.

In line with a previous study [33], trends of prison population rates were not uniform, but tended towards a mean. Relatively low prison population rates increased, while high rates tended to decrease, reconciling at levels of about 200 per 100 000 population. This was in contrast with continuously increasing trends of prison populations in the developing region of Latin America [34]. The observed trends in CEECA were similar to a continuous decrease of the rates of general psychiatric beds and modest increases of forensic and residential psychiatric places as well as prison populations in Western Europe over the last three decades [59].

Complex migration processes [60,61] of the last decades and disputed territories [62,63] might also contribute to the changes of

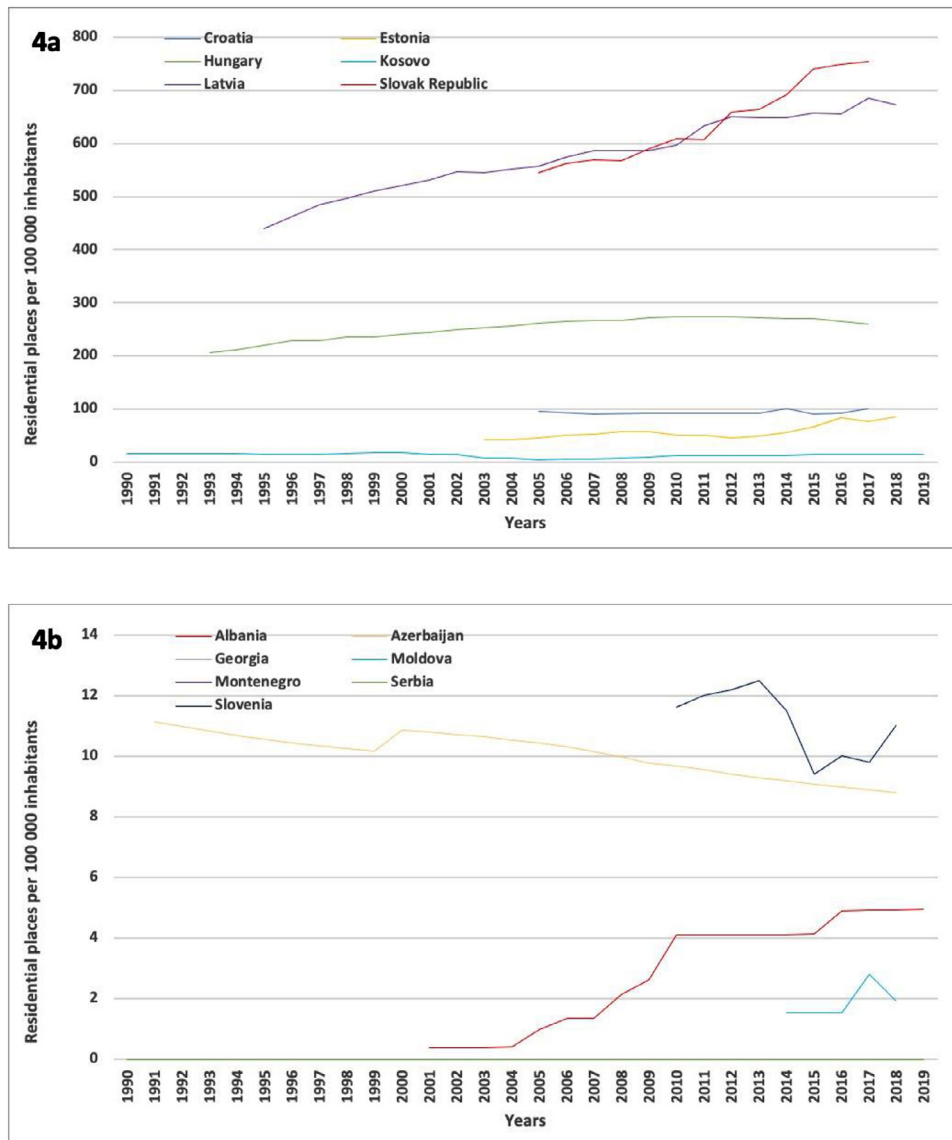


Fig. 4. Numbers of residential places for mentally ill people per 100 000 population (1990–2019). a) Countries with rates higher than 12 per 100 000 population at the last data point; b) Countries with rates lower than 12 per 100 000 population at the last data point. Georgia, Montenegro and Serbia did not have any places in supported housing facilities throughout the entire time span.

institutionalization in countries or regions that have undergone armed conflicts or major political changes, such as the Balkan and some of the former-Soviet countries. In the Ukraine, access to data on psychiatric beds and prison populations was no longer available for the occupied territories since 2014.

The majority of countries (57%) showed inverse trends of decreasing rates of psychiatric beds, while prison population rates increased, in support of the Penrose Hypothesis. However, 12 countries (40%), among them the most economically challenged, underwent parallel decreases in rates of prison populations and psychiatric beds, in line with the hypothesis presented by Large and Nielssen that poorly resourced governments are not able to pay for any type of custodial service [26]. Kosovo was the only country with increasing trends of both indicators.

Countries that were formerly part of the Soviet Union—who, on average, had lower income levels—showed a greater decrease of psychiatric beds than the other countries in CEECA. Interestingly, the same group of countries also showed a decrease or lower levels of increase regarding prison population rates when compared with

higher income economies or non-Soviet countries. One could hypothesize that increasing income levels may have been a driver of prison populations in the region, which would be in line with research from Latin America [32,34].

Previous research has used statistical models to assess associations between the indicators of institutionalization and economic indicators [25,32,34]. Even though such models attempt to resolve uncertainty, the robustness is limited [64,65]. We abstained from using such models of trend analysis, because CEECA countries had very heterogeneous rates at the starting points of the observation period and heterogeneous trends. Furthermore, those analyses cannot bring definitive clarity on causal relationships and may distract from the absolute levels which are most important for service development. Sufficient evidence on the interdependence of correctional systems and psychiatric hospitalization services has been given from studies on individual trajectories and the prevalence rates of mental health problems in prison populations which regularly show that vast majorities are affected.

Table 4 Median rates of psychiatric beds, specialized forensic psychiatric beds, residential places, and prison population in Central Eastern Europe and Central Asia by groups of a priori defined trends.*

Trends for psychiatric beds and prison population	Psychiatric beds per 100,000 population			Specialized forensic beds per 100,000 population			Beds in Residential facilities per 100,000 population			Prison population per 100,000 population		
	First data point	Last data point	Percentage change	Rate at first point	Rate at last point	Percentage change	Rate at first point	Rate at last point	Percentage change	Rate at first point	Rate at last point	Percentage change
Inverse trends**												
Median	77•8	54•3	-30•1	1•6	4•7	185•1	6•0	8•0	33•0	84•6	180•5	113•4
Mean values	80•5	54•8	-31•9	3•5	4•7	32•9	106•7	141•2	32•4	117•5	200•6	70•7
Number of countries	17	17		10	10		8	8		17	17	
Decreasing trends***												
Median	94•2	52•4	-44•4	2•3	4•0	72•6	26•2	47•0	79•5	256•0	162•8	-36•4
Mean values	111•8	58•3	-47•9	2•7	3•6	32•5	121•1	192•3	58•7	256•3	181•3	-29•3
Number of countries	12	12		7	7		4	4		12	12	

* Kosovo excluded from analysis (only country with increasing trends in both indicators).

** Albania, Belarus, Bosnia and Herzegovina, Croatia, the Czech Republic, Georgia, Hungary, Lithuania, Montenegro, North Macedonia, Poland, Serbia, the Slovak Republic, Slovenia, Tajikistan, Turkey, and Turkmenistan.

*** Armenia, Azerbaijan, Bulgaria, Estonia, Kazakhstan, the Kyrgyz Republic, Latvia, Moldova, Romania, Russian Federation, Ukraine, and Uzbekistan.

4.3. Strengths and limitations

We assessed trends of indicators of institutionalization in 30 countries over three decades, updating previous research on the same indicators from 12 countries over two decades [33]. We retrieved data from primary sources in most participating countries and, therefore, have confidence to present reasonable quality of data.

Limitations of this study are the ecological design and descriptive statistics do not allow to assess associations between indicators. The lack of primary data from five countries of the region, and incompleteness of data for several countries and indicators, were also limitations of the study. Missing data points were common, especially for forensic beds and residential facilities. Secondary sources of data were more frequently necessary for prison populations than for psychiatric beds. The incompleteness of the data limits the comparability of percent changes between countries due to the different observation periods between first and last data points. Considerable difficulties arise from the lack of uniform definitions of psychiatric beds, specialized forensic beds, and places in residential/housing facilities in different countries. Finally, the limited number of data points did not permit more sophisticated time series analyses in countries, such as co-integration analyses, to provide more precise estimates of associations over time.

4.4. Implications

Scarcity of data, especially related to mental health, can be a major challenge to service development in the CEECA region specifically, and in LMICs in general [66]. Therefore, internationally standardized data collections on important indicators of institutionalization for mentally ill populations are needed in LMICs such as those in CEECA, in order to internationally compare mental health systems [67]. This will allow countries to see where they need improvement and adopt successful strategies from other regions with similar population demographics and contexts.

There is an overall trend of decreasing rates of psychiatric beds in CEECA. In order to develop public policies to improve mental health services, further research on trends and targets for psychiatric bed numbers is required. Prison population rates did not show any uniform trends, although they tended to increase in countries with lower rates and decrease in countries with higher rates, indicating a regression towards the mean. Historical, societal, and political factors that may influence healthcare decision making, and therefore changes in rates, need to be further explored. Mechanisms for a possible interdependence of psychiatric bed numbers and prison population rates in CEECA should be further investigated on the country level or based on subgroups of countries. In addition to the assessment of static measures of psychiatric bed numbers and prison populations, the dynamic data, such as admissions to the institutions can provide further information on a possible interdependence of the systems [68].

Consensus on how many psychiatric beds mental health systems need has not yet been reached and normative approaches have been proposed to provide orientation [69]. An alternative is to observe possible outcomes using key performance indicators and population outcomes, in order to estimate the bed requirements based on those indicators [70]. Among the outcomes could be the rates of prison populations and their trends.

All the forms of institutionalized care assessed in this study come with considerable costs to societies and have substantial consequences for the many people who are directly or indirectly affected. Thus, it should be in the interest of all countries to have policies that are as appropriate and effective as possible. For developing such policies, a comparison of data across countries that are in a similar historical context must be a useful step. In this case, our comparison revealed

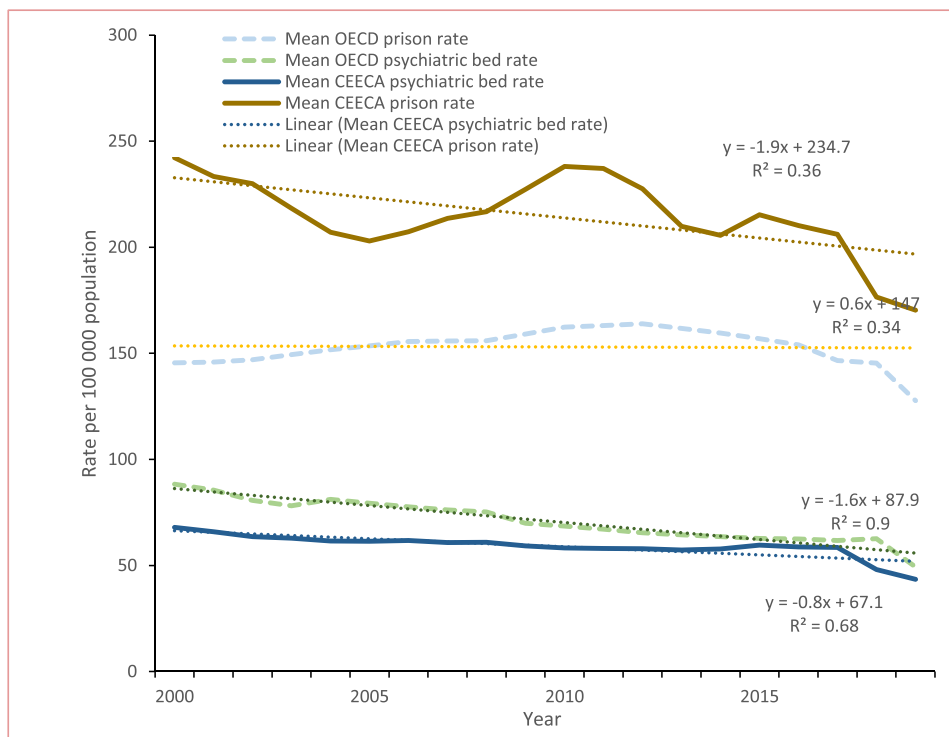


Fig. 5. Mean psychiatric bed and prison population rates in Central and Eastern European and Central Asian Countries compared with OECD countries.

major differences which may facilitate both more detailed and reliable data recording and learning from each other.

Contributors

APM conceptualization, project administration, funding acquisition, supervision and validation. VA, FI, YER, MH, TF, PC, JH, GG, MPK, MA, SN, NFI, EM, MT, JC, JD, PG, NT, AG, DLT, DR, LI, VŠ, MV, NK and OS investigation, data curation, methodology, writing - review & editing. APM, ERS, MS and SP methodology, software, writing - original draft, writing - review & editing.

Declaration of Competing Interests

We declare no competing interests.

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Data sharing statement

A complete database of all indicators and countries is available in the [supplement 1](#).

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.lanepe.2021.100137](https://doi.org/10.1016/j.lanepe.2021.100137).

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