

Crowding risk factors for coronavirus transmission in social care facilities

Factores de riesgo de hacinamiento para la transmisión de coronavirus en centros de asistencia social

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Recibido: 24 de febrero de 2025

Aceptado: 4 de junio de 2025

Publicado: 23 de julio de 2025

Cómo citar este artículo:

Bocharova, Irina & Ryanov, Alexander (2025). Crowding risk factors for coronavirus transmission in social care facilities. *Novedades en Población*, 21(42) <http://www.novpob.uh.cu>

Abstract

The study examines the factors that facilitate the transmission of the coronavirus in Russian public long-term care facilities due to overcrowding. All types of adult

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care facilities were exposed to an elevated risk of infection with the novel coronavirus during the global pandemic. These factors include (A) a high average number of residents, (B) an increase in the number of residents during the pandemic, and (C) a failure to comply with the standard for the provision of floor space. These risk factors were especially prevalent in psychoneurological boarding schools for adults and special boarding homes. Spatial estimates indicate that at the onset of the coronavirus pandemic, 12% of the country's regions were experiencing overcrowding in public long-term care facilities, which had a deleterious impact on the implementation of measures to prevent the emergence and spread of the coronavirus infection. At the onset of the coronavirus pandemic, disparities between regions reached a maximum level in comparison to the pre-pandemic and late-pandemic periods.

Keywords: care home, long-term care, novel coronavirus, overcrowding, occupancy

Resumen

El estudio examina los factores que facilitan la transmisión del coronavirus en los centros asistenciales rusos de cuidados de larga duración debido al hacinamiento. Todos los tipos de centros de atención a adultos estuvieron expuestos a un riesgo elevado de infección por el nuevo coronavirus durante la pandemia mundial. Entre estos factores se incluyen (A) un número medio elevado de residentes, (B) un aumento del número de residentes durante la pandemia, y (C) el incumplimiento de la norma relativa a la provisión de espacio de suelo. Estos factores de riesgo eran especialmente prevalentes en los internados psiconeurológicos para adultos y en los internados especiales. Las estimaciones espaciales indican que, al inicio de la pandemia de coronavirus, el 12% de las regiones del país experimentaban hacinamiento en los centros

públicos de cuidados de larga duración, lo que tenía un impacto perjudicial en la aplicación de medidas para prevenir la aparición y propagación de la infección por coronavirus. Al inicio de la pandemia de coronavirus, las disparidades entre regiones alcanzaron un nivel máximo en comparación con los periodos pre-pandémico y pandémico tardío.

Palabras clave: *residencias, cuidados de larga duración, nuevo coronavirus, hacinamiento, ocupación*

Introduction

Maintaining physical distance from others is an affordable and effective means of preventing coronavirus infection (WHO, 2020a; WHO, 2020b). However, this is not always feasible in long-term care facilities. Furthermore, in many countries, these settings have been identified as a significant contributor to high coronavirus mortality rates during the pandemic (Comas-Herrera et al., 2020). Consider current research on the issues at hand.

Nursing home crowding.

A retrospective cohort study was conducted in nursing homes in Canada (Leece et al., 2023). Results show that nursing homes with high occupancy had higher respiratory infection incidence and mortality than homes with low occupancy. Recent study (Costa-Font et al., 2021) identifies a relationship between the observed mortality rate in nursing homes in Spain and a number of proxies for inadequate funding. Among these are the size of the facility and its occupancy rate. The results of the study indicate a correlation between the size of nursing homes in Spain and the incidence of fatalities in these facilities. Specifically, regions with bed capacity exceeding 100 beds have exhibited higher than average mortality rates, whereas regions with an average capacity of approximately 50 beds have shown a lower incidence of fatalities. A correlation

has been identified between the number of deaths and the occupancy rates of nursing homes in Spain. Specifically, regions with nursing homes that were operating near full capacity experienced a higher number of deaths than regions with lower occupancy rates.

The authors conclude that regions exhibiting a greater prevalence of nursing home occupancy tend to demonstrate a higher proportion of nursing home-related deaths within the broader category of excess deaths (Costa-Font et al., 2021).

The number of long-term care facilities.

In a study conducted by researchers at Nizhny Novgorod University (6 Saraliev et al., 2023), the number of long-term care facilities and the corresponding number of pensioners and disabled people in them for the period between 2005 and 2021 were analyzed. The results of the study indicate a decline in the number of facilities over the course of the study period.

Collecting best practices.

In the first months of the coronavirus epidemic, studies of the long-term care sector have been actively collecting Russian and international best practices, legal provisions and policy assessments in this field (Vladimirova, Afonina, Chernyakina, 2020).

Features of functioning of long-term care facilities in Belarus were already taken into account (Glinskaya, Shchavaleva, 2021).

Long wait times for individuals seeking admission to long-term care facilities.

The necessity of awaiting admission to long-term care facilities gives rise to justified concerns among researchers (Safonov & Isaev, 2020; Akimova & Polushkina, 2023). The functionality of long-term care facilities in Saratov Oblast during the Coronavirus pandemic was similarly defined by the existence of

waiting lists for admission to psychoneurological boarding schools (Izvarina, 2022).

The shift work of staff.

The shift work regime for long-term care facility staff played an integral role in preventing the proliferation of coronavirus infections during the pandemic (Ovcharova, Sinyavskaya, 2022). While this work regime was mandatory in Russia, it was optional or absent in many other countries.

Reforming the long-term care system.

Samofatova (2019a, 2019b, 2019c) provides a detailed analysis of the long-term care reform.

Human Rights.

Izvarina (2022) highlights the role of the Ombudsman for Human Rights in the Saratov Region in safeguarding the most vulnerable categories of the population in long-term care facilities for the elderly and disabled. The Commissioner's appeals to the executive authorities of the region were directed at the implementation of supplementary measures to impede the proliferation of the coronavirus within these institutions. Kopylova (2022) conducted an examination of the operational scope of socially oriented non-profit organizations within the Tambov region.

Contradictions in the Russian legal regulation.

Contradictions in the national legal regulation of the federal and regional levels when referring residents to long-term care facilities have been revealed in the current legal literature (Grishko 2021).

The behavioral response to the challenges posed by the pandemic. The response of staff in long-term care facilities to the challenges of the coronavirus pandemic exhibited considerable variation. The study identified a range of behaviors based

on a survey of agency managers, with a notable emphasis on the role of external and internal controls (Kareva et al., 2023).

The reduction in the number of long-term care facilities in the period preceding the pandemic, along with the existence of waiting lists for admission to such facilities, as previously discussed and evidenced by numerous studies, suggests the presence of significant issues related to overcrowding in long-term care facilities. This study builds upon this topic by providing estimates of overcrowding in long-term care facilities and its potential impact on the transmission of coronavirus infection.

The objective of this study is to identify factors associated with an elevated risk of coronavirus infection in long-term care institutions, considering both organizational and spatial dimensions. The organizational aspect encompasses different institutional types, while the spatial dimension refers to distinct geographical regions.

The estimates were derived through the application of conventional techniques in descriptive statistics. The estimates utilize official data on the activities of Russian long-term care facilities (Rosstat, 2019a, 2019b, 2021a, 2021b, 2023a, 2023b).

Materials & Methods

The estimates were derived through the application of conventional techniques in statistics.

The study is based on an analysis of aggregated, anonymized, observational data on the activities of LTCFs (18-23).

The study received ethical approval from the local IRB. The official data used in the study are in the public domain (18-23).

Results

1. Facilities providing long-term care for adults and children

1.1. The ratio of long-term care facilities for adults to those for children

In this section, we examine the key indicators of the functioning of long-term care facilities.

The majority of these care facilities are those serving the elderly and disabled population. The proportion of these facilities decreased from 90% to 85% between 2015 and 2022. Conversely, the proportion of long-term care facilities for children with disabilities increased over the period under review, from 10% to 15% (with a peak of 16% in some periods) (Figure 1).

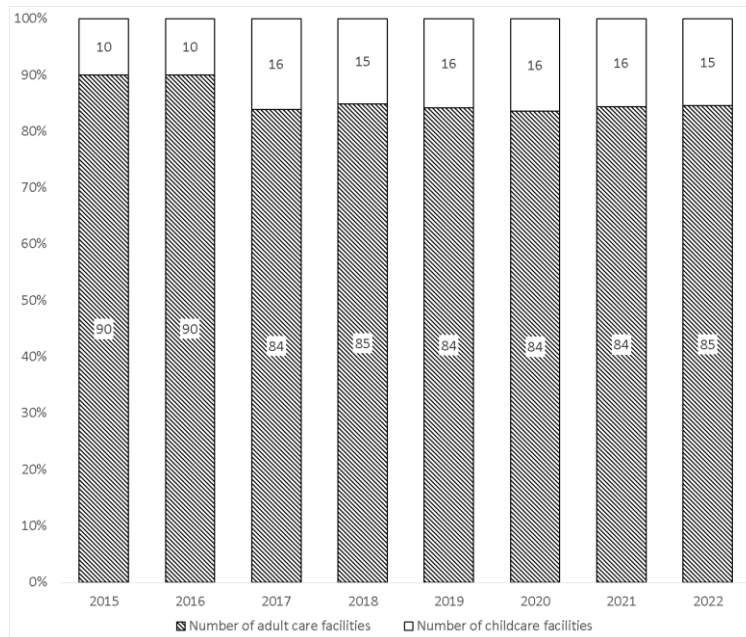


Figure 1. The ratio of long-term care facilities for adults to those for children (%)

1.2 Changes in the Number of Long-Term Care Facilities for Adults and Children

The total number of long-term care facilities for the period between 2015 and 2022 was approximately 1,500, with a maximum number observed in 2017 (1,558 facilities) and a minimum level in 2016 (1,418 facilities). Following an increase from 2015 to 2017 in the total number of care facilities (by 8%), there was a subsequent decrease from 2017 to 2022 to a level almost identical to that observed in 2015 (by 7%) (Figure 2). This trend was the result of a unidirectional change in the number of constituent care facilities, specifically those catering to adults and children. To illustrate, the number of care facilities for the elderly and disabled (adults) increased by 1% from 2015 to 2017, while the number of care facilities for children with disabilities increased by 74%. From 2017 to 2022, the number of care facilities of the former type decreased by 6%, while the number of care facilities of the latter type decreased by 11%.

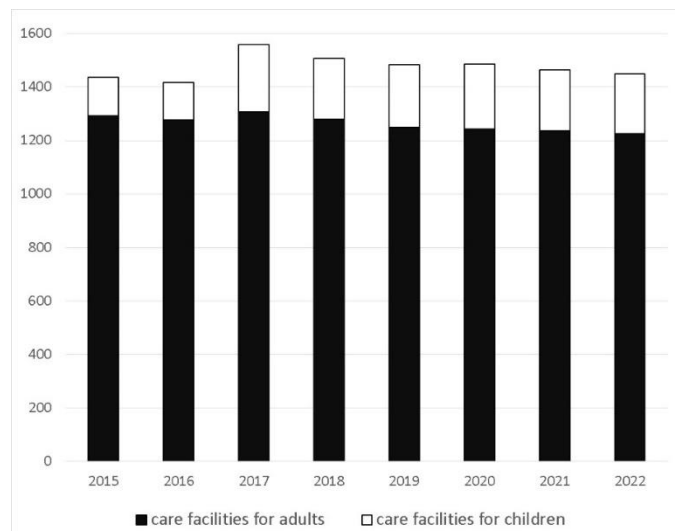


Figure 2. Changes in the Number of Long-Term Care Facilities for Adults and Children

1.3. Average capacity of long-term care facilities

The mean number of long-term care beds per care facility (mean capacity) during the period of the coronavirus pandemic (2020-2022) exhibited minimal change. This is the case for both adult and pediatric care facilities (see Figure 3).

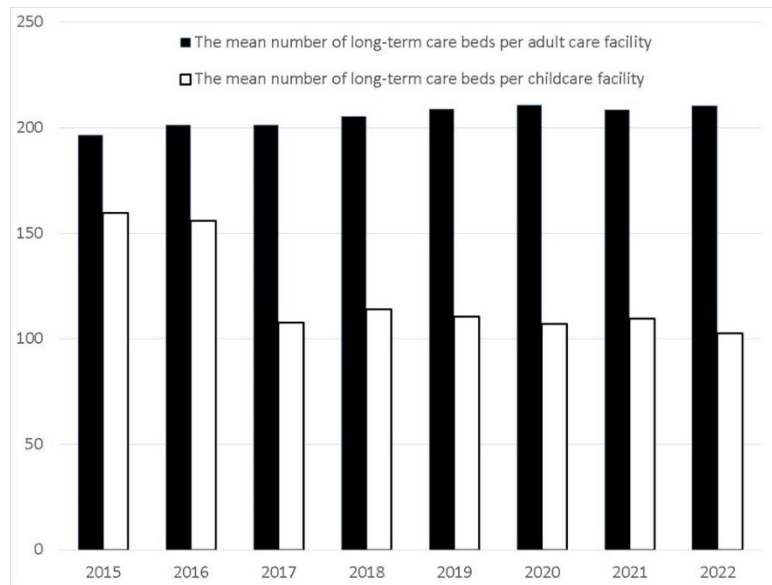


Figure 3. Average capacity of long-term care facilities, expressed in terms of the number of places per care facility (average for the Russian Federation), units

Over the period under review (2015-2022), the mean capacity of adult care facilities exhibited a slight increase ($M = 205$ beds, $SD = 5.2$). The mean capacity of care facilities for children exhibited a decline (mean = 121 beds, standard deviation = 23.1) ($M = 121$ beds, $SD = 23.1$).

Notable shifts in the indicator under examination were observed in 2017, with a considerable decline (31%) in the average number of beds per care facility for children with disabilities. Furthermore, during the coronavirus pandemic, the

average capacity of care facilities for adults was approximately twice that of care facilities for children.

2. A comparative analysis of the occupancy rates of various adult long-term care facilities both prior to and during the course of the Coronavirus pandemic

2.1 An evaluation of the average number of residents (adults) within distinct categories of long-term care facilities, both in the period preceding and throughout the pandemic.

It is enlightening to examine the mean number of residents in various types of adult long-term care facilities both before and during the Coronavirus pandemic (see Figure 4).

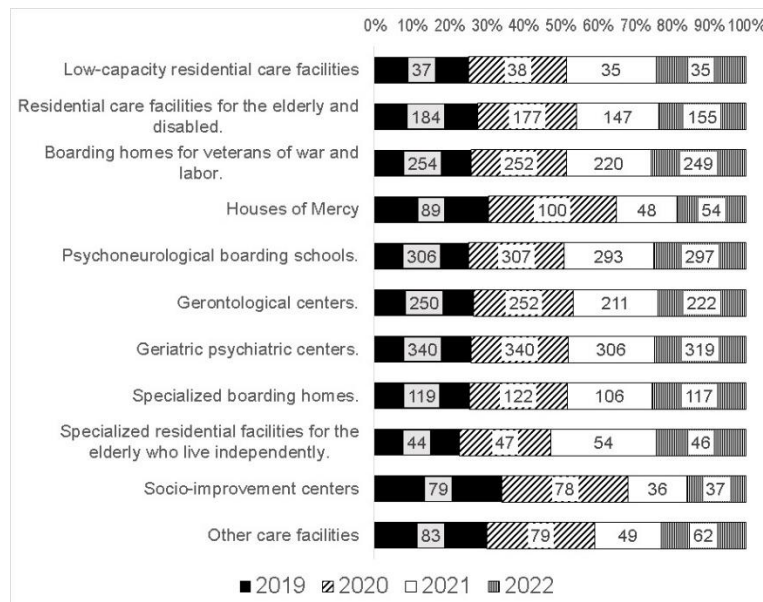


Figure 4. Average number of residents (adults) in different types of long-term care facilities in Russia (people)

The highest occupancy rates were observed during the period spanning 2019 to 2022 in gerontopsychiatric centers (M = 326 beds, SD = 16.7), psychoneurological residential institutions (M = 301 beds, SD = 7.1), residential homes for World War II and labor veterans (M = 244 beds, SD = 15.6), gerontological centers (M = 234 beds, SD = 20.3), and residential homes for the elderly and disabled (M = 166 beds, SD = 17.6).

These types of long-term care facilities were particularly vulnerable to increased risk of coronavirus infection during the pandemic due to higher resident crowding.

The least crowding of residents in 2019-2022 was observed in low-capacity nursing homes (M = 326 beds, SD = 16.7) and in specialized homes for elderly people alone (M = 48 beds, SD = 4.5). Accordingly, during the coronavirus pandemic, these types of long-term care facilities were highlighted by a reduced risk of coronavirus infection with respect to the effects of overcrowding.

2.2 A comparative analysis of the mean number of adult residents in various long-term care facilities before and during the pandemic.

Figure 5 illustrates the shift in the mean number of residents across various long-term care facilities for adults, both before and during the coronavirus pandemic. The comparison is based on the average number of residents in different types of long-term care facilities for the elderly and disabled (adults) (see Figure 5).

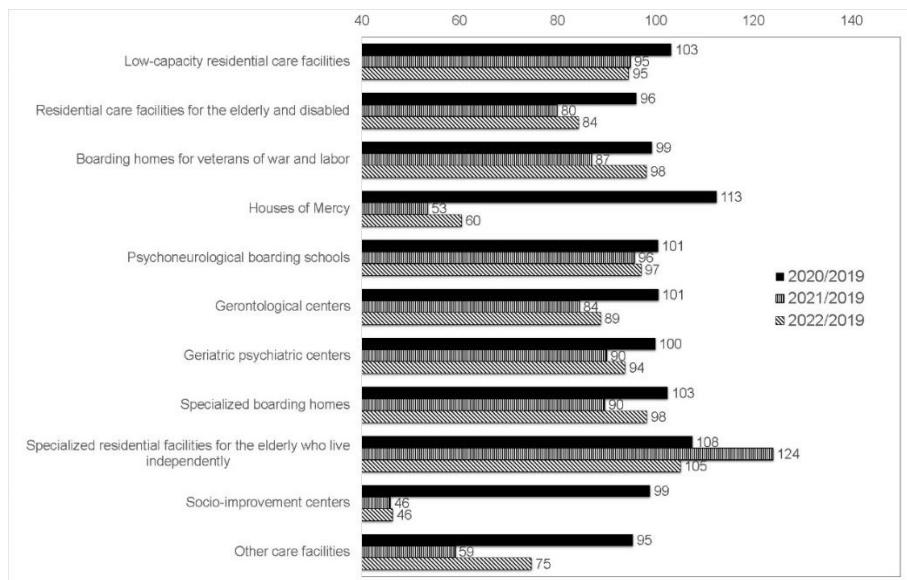


Figure 5. The change in the mean number of adult residents in long-term care facilities of varying types before and during the pandemic (%)

The mean number of residents in long-term care facilities of various types for adults during the pandemic periods under consideration (2020-2022) surpassed the pre-pandemic level (2019).

In 2020, the mean number of residents in long-term care facilities exceeded the pre-pandemic 2019 level in the following types of facilities: small-capacity organizations, mercy homes, psychoneurological boarding schools, gerontological centers, special boarding homes, and special homes for the elderly alone. In sum, the mean number of residents in long-term care facilities of various types for adults exhibited a notable increase compared to 2019 ($M = 102\%$, $SD = 4.9$).

In both 2021 and 2022, the mean number of residents in long-term care facilities exceeded the pre-pandemic 2019 level for one type of facility: special homes for single seniors (124% and 105%, respectively).

In 2021, the mean number of residents in long-term care facilities of various types for adults was found to be generally lower than in 2019 ($M = 82\%$, $SD = 22.2$).

In 2022, the mean number of residents in long-term care facilities of various types for adults was found to have decreased in comparison to 2019 ($M = 86\%$, $SD = 18.1$).

Therefore, residents of all aforementioned types of long-term care facilities, who exhibited an excess of their average long-term care facility population above the pre-pandemic level during the pandemic, were at an elevated risk of contracting the coronavirus.

3. The aggregated occupancy rates in long-term care facilities in Russia.

3.1 Long-term care facilities for the elderly and disabled (adults).

In the period between 2015 and 2022, the number of long-term care facilities for adults remained relatively stable (see Figure 2). Similarly, the number of beds in these facilities experienced only minor fluctuations ($M = 259.5$ thousand beds, $SD = 1.1$) (Figure 6). However, the number of residents in these long-term care facilities exhibited greater variability. In certain periods, specifically 2017-2018, the number of residents surpassed the number of official beds ($M = 259.0$ thousand beds, $SD = 4.7$).

In a similar manner, the occupancy rate in long-term care facilities exhibited considerable variation ($M = 99.8\%$, $SD = 4.7$).

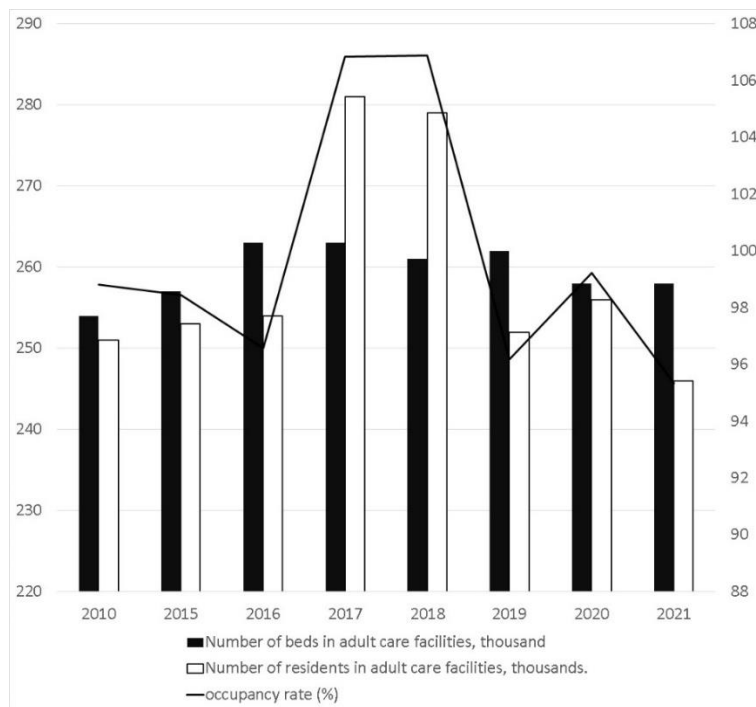


Figure 6. A modification in the quantity of long-term care facilities for the elderly and disabled (adults)

3.2 Long-term Care Facilities for Children with Disabilities

The larger variation in the number of long-term care facilities for children with disabilities (Figure 2) partially accounts for the fluctuations in the number of beds in this category of long-term care facilities between 2015 and 2022 ($M = 24.8$ thousand care beds, $SD = 0.6$) (Figure 7).

Furthermore, the number of children residing in these long-term care facilities demonstrated a notable degree of variability ($M = 29.6$ thousand beds, $SD = 3.0$). For a considerable portion of the study period (2016-2021), the number of children in these facilities exceeded the number of official beds available (Figure 7).

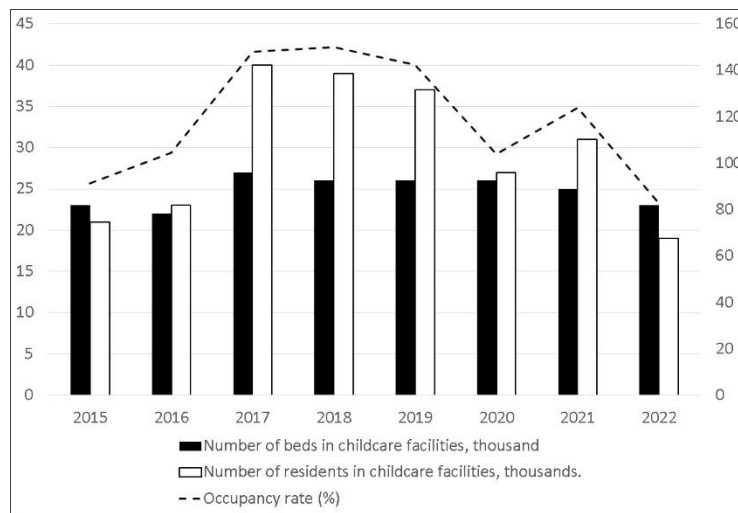


Figure 7. Change in the number of long-term care facilities for children with disabilities in Russia (2015-2022)

4. The failure to comply with the established norms for the provision of floor space for residents of long-term care facilities.

Federal legislation delegates to the regional level the establishment of standards for the operation of long-term care facilities, including the number of staff, provision with equipment, and floor space. For the purposes of this study, we limit our consideration of these standards to the aforementioned areas.

As an example, the city of Moscow has established norms for providing long-term care facilities with floor space (Table 1).

Types of care facilities	Floor space	
	sq. m.	sq. ft.
Children's boarding homes	6-8	65-86
Family upbringing support centers	11,78-14,84	130-160
Specialized orphanages	11,78	130
Social adaptation centers	20	220

Social shelters for children and adolescents, social rehabilitation centers for minors	14,5	160
Crisis centers for women and children	7-9	75-97
Psychoneurological and gerontopsychiatric organizations	6-8	65-86
General long-term care facilities	7-9	75-97

Table 1. The norms for the provision of floor space for residents of care facilities in Moscow

The lowest standards are provided for children's residential homes, psychoneurological and gerontopsychiatric organizations, and long-term care facilities of a general type for adults.

In order to assess compliance with these standards, it is necessary to consider aggregated indicators at the country level. In order to achieve this, the aggregate indicator of the proportion of residents of long-term care facilities residing in conditions that contravene the aforementioned standard was employed. A comparison was conducted between different types of long-term care facilities for adults (Figure 8) and for children (Figure 9).

In long-term care facilities for adults, the most notable deviations from established norms were identified in psychoneurological boarding schools (approximately 11% of residents lived in inadequate conditions), special residential homes (6-9%), and social and health centers (up to 14%) both before and during the pandemic.

The advent of the coronavirus pandemic markedly exacerbated the situation with regard to compliance with this standard in small-capacity residential homes and social and health centers. In contrast, during the course of the coronavirus pandemic, residents of mercy boarding homes and special homes for the elderly living alone were able to reside in conditions that met the relevant normative standards (Figure 8).

In long-term care facilities for children, the situation with regard to compliance with this normative standard in boarding homes and other long-term care facilities worsened significantly with the onset of the pandemic in 2020. However, the situation had already stabilised the following year. In neuropsychiatric institutions for children, the situation improved with the onset of the pandemic, although non-compliance remained (Figure 9).

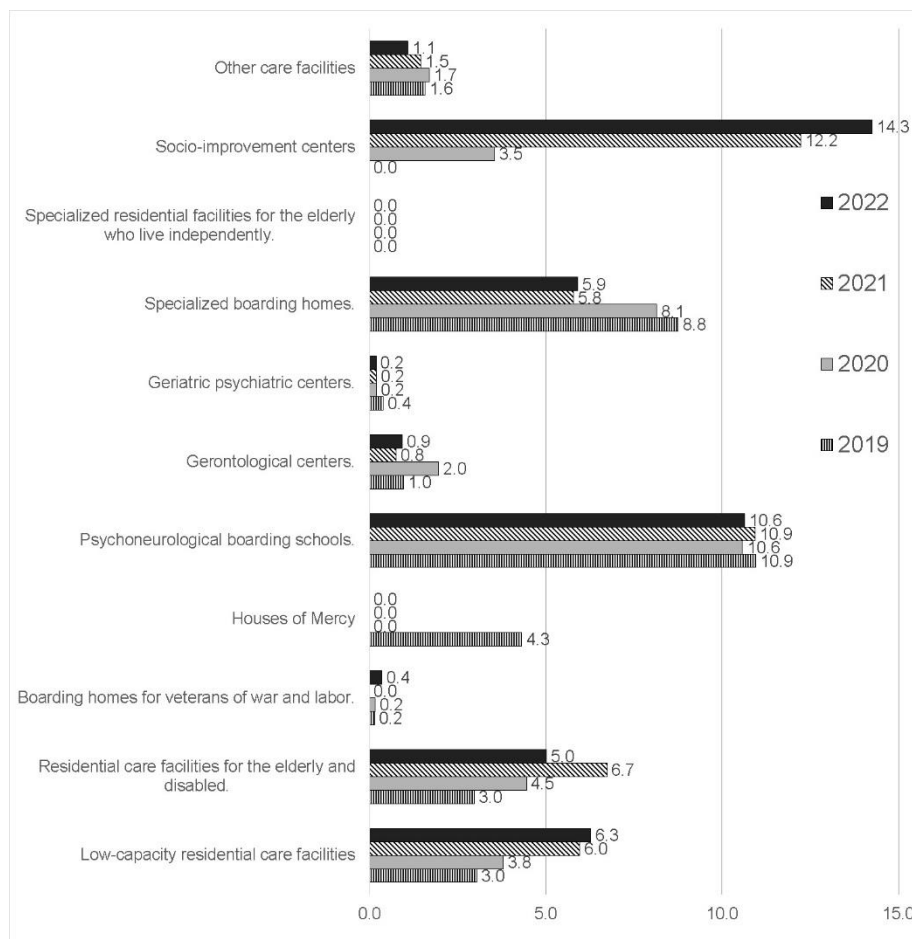


Figure 8. Proportion of residents living in adult care facilities with less than the standard floor space before and during the pandemic (%)

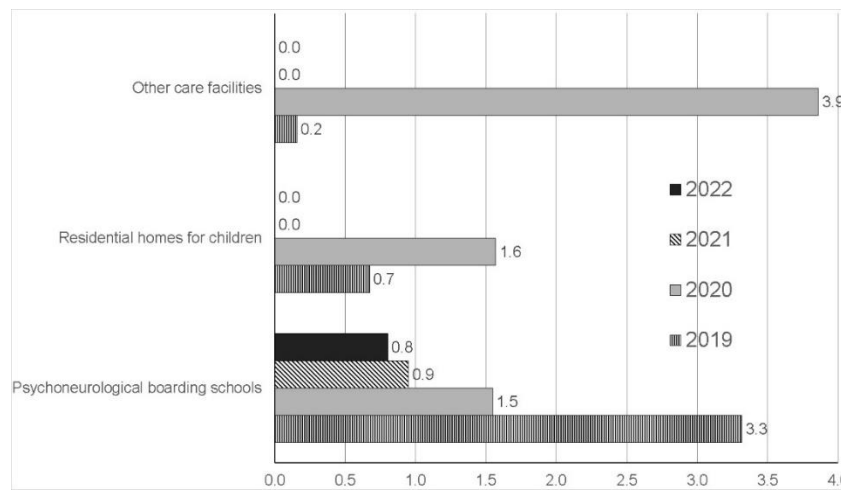


Figure 9. Proportion of residents living in child care facilities with less than the standard floor space before and during the pandemic (%)

It was observed that there was a failure to comply with the established norms for the provision of floor space in a number of care facilities for adults, including psychoneurological boarding schools, special residential homes, social and health centers, small-capacity residential homes, and social and health centers. Similarly, in care facilities for children, there was a failure to comply with the established norms for the provision of floor space in residential homes and other care facilities. Furthermore, prior to and throughout the Coronavirus pandemic, there was a notable lack of adherence to the established norms for the provision of floor space. This resulted in a considerable increase in the crowding of residents in long-term care facilities, which significantly elevated the risk of transmission of the Coronavirus infection.

5. A summary of the factors that increase the risk of exposure to the novel coronavirus (2019-nCoV) in different types of adult care facilities.

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It is worth considering the summary of estimates of the factors (A, B, and C) listed above (Sections 2-4) for increased risks of coronavirus exposure in different types of adult care facilities (Table 2).

As can be observed, residents in all types of care facilities were, to a greater or lesser extent, at an elevated risk of coronavirus infection. The table illustrates the numerical values of the risk-increasing factors in the various types of care facilities. The absence of a value in a cell indicates the absence of an increased risk.

Types of care facilities	Factors increasing risks				
	Factor A: Average number of residents (adults) in 2020-2022.	Factor B: Population growth during the pandemic (%)			Factor C: Proportion of residents living in care facilities with less than the standard floor space before and during the pandemic (%)
		2020	2021	2022	
		0 / 2019	1 / 2019	2 / 2019	
I.	36	103			4-6
II.	160				
III.	240				
IV.	67	113			
V.	299	101			11
VI.	228	101			
VII.	322				
VIII.	115	103			6-9
IX.	49	108	124	105	
X.	50				4-14

Type of care facilities:

I. Low-capacity residential care facilities

II. Residential care facilities for the elderly and disabled.

III. Boarding homes for veterans of war and labor.

IV. Houses of Mercy

V. Psychoneurological boarding schools.

VI. Gerontological centers.

VII. Geriatric psychiatric centers.

VIII. *Specialized boarding homes.*

Socio-improvement centers

IX. *Specialized residential facilities for the elderly who live independently.*

Table 2. Summary of the estimated increased risk factors for infection in different types of adult care facilities

All three risk enhancement factors (A, B, and C) were identified in care facilities of the fifth and eighth types (Table 3). Two risk enhancement factors each were observed in care facilities of the first and sixth types. One risk enhancement factor was identified in care facilities of the second, fourth, seventh, ninth, and tenth types.

Type of care facilities	Factors increasing risks		
	Factor A: Average number of residents (adults) in 2020-2022	Factor B: Population growth during the pandemic (%)	Factor C: Proportion of residents living in care facilities with less than the standard floor space before and during the pandemic (%)
I. Low-capacity residential care facilities		+	+
II. Residential care facilities for the elderly and disabled.	+		
III. Boarding homes for veterans of war and labor.	+		
IV. Houses of Mercy		+	
V. Psychoneurological boarding schools.	+	+	+
VI. Gerontological centers.	+	+	
VII. Geriatric psychiatric centers.	+		
VIII. Specialized boarding homes.	+	+	+

IX. Specialized residential facilities for the elderly who live independently.	+
X. Socio-improvement centers	+

Table 3. Summary of the factors that increase the risk of infection in different types of adult care facilities

6. Regions: occupancy rates in long-term care facilities before and during the coronavirus pandemic

6.1 Breakdown of regions by long-term care occupancy rate

Consider the structure of the regions by the occupancy rate of long-term care facilities (Figure 10).

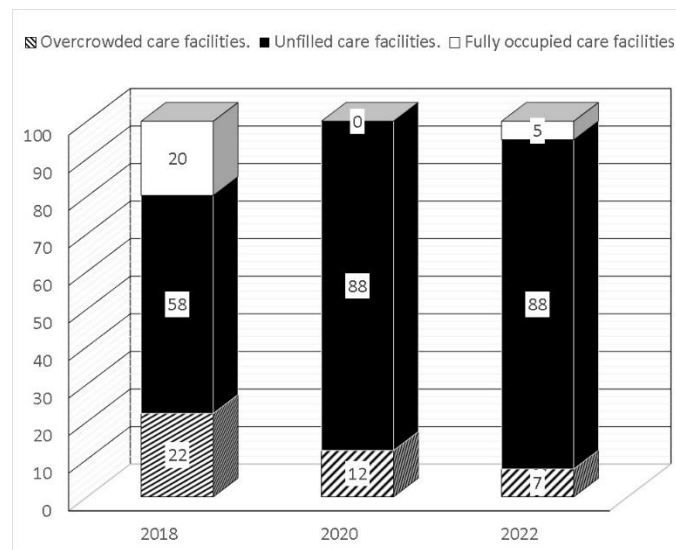


Figure 10. The distribution of regions by occupancy rates in long-term care facilities

In the majority of regions (88% in 2020 and 2022 and 58% in 2018), long-term care facilities exhibited a low occupancy rate, with fewer than 100% of their beds occupied. The estimates are based on a comparison of consolidated data on the number of residents and the number of places in long-term care facilities according to Rosstat data (Rosstat, 2023a).

Notwithstanding, in a number of regions, long-term care facilities were operating with an occupancy rate in excess of 100%. Specifically, in 2018 this applied to 22% of regions, in 2020 to 12% of regions, and in 2022 to 7% of regions.

In a number of regions, long-term care facilities were at full capacity, with the number of available places being met. This was observed in 2018 in 20% of regions, in 2020 in 0% of regions, and in 2022 in 5% of regions.

Consequently, during the initial phase of the coronavirus pandemic, 12% of the country's regions exhibited a state of overcrowding in long-term care facilities, which inevitably resulted in the impairment of preventive measures aimed at curbing the emergence and propagation of coronavirus infections.

6.2 Overcrowding in long-term care facilities

Examine the occupancy rate of long-term care facilities in 2018, 2020, and 2022 in different regions of the country (see Figure 11).

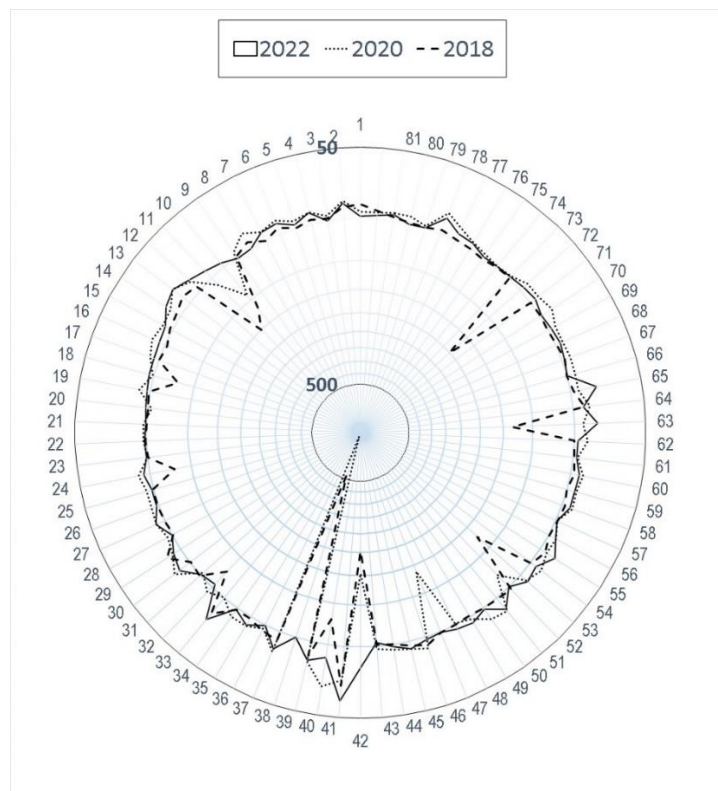


Figure 11. Long-term care facility occupancy rates (2018, 2020, and 2022) by region (%)

At the outset of the pandemic in 2020, the occupancy rate of long-term care facilities across the country's regions exhibited a considerable range, from 66% (indicating no occupancy) to 7.7 times (signifying extreme overcrowding). The mean occupancy rate was 103.4%, with a standard deviation of 77.1%. The region of the Republic of Ingushetia exhibited the highest degree of overcrowding. However, the exclusion of this region from the analysis resulted in an overcrowding rate of two times ($M = 95.0\%$, $SD = 18.5$).

By 2022, the situation with the occupancy rate of long-term care facilities in the regions had undergone slight alterations. The occupancy rate of long-term care

facilities in the country's regions ranged from 59% (no occupancy) to 104% (overcrowding) ($M = 93.4\%$, $SD = 7.3$).

In the period preceding the pandemic (2018), the occupancy rates in long-term care facilities across the country's regions exhibited a considerable range, from a mere 68% (indicating no occupancy) to a high of 5.1 times (indicating overcrowding). The mean occupancy rate was 111.5%, with a standard deviation of 54.7 (Table 4).

Indicator	2018	2020	2022
mean	111,5	103,4	93,4
standard deviation	54,7	77,1	7,3

Table 4: Occupancy in long-term care facilities in the regions (2018, 2020, 2022)

Consequently, more comprehensive assessments of occupancy rates in long-term care facilities at the regional level indicate that disparities between regions reached their zenith at the advent of the coronavirus pandemic (2020) in comparison to the pre-pandemic (2018) and late-pandemic periods (2022). With regard to regional averages, instances of overcrowding were observed in 2018 and 2020.

Extreme overcrowding in long-term care facilities in selected regions.

In examining the issue of overcrowding in long-term care facilities, it is important to consider the impact of the pandemic in regions with significant overcrowding (Figure 12).

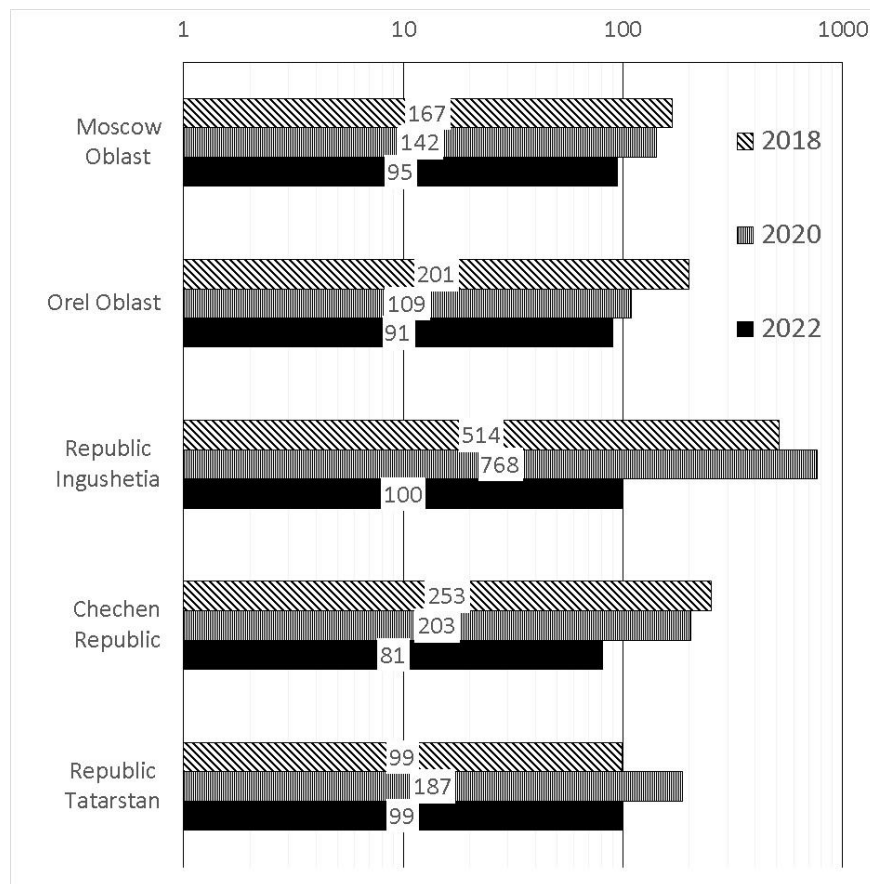


Figure 12. Extreme overcrowding in long-term care facilities in selected regions

The regions encompassed by this study include Ingushetia, Tatarstan, the Chechen Republic, the Moscow and Orel oblasts. The data presented here include data from before the pandemic (2018) and during the pandemic (2020 and 2022).

In the initial year of the coronavirus pandemic (2020), the occupancy rate in care facilities in these regions markedly exceeded the normative values ($M = 282\%$, $SD = 274.4$). By 2022, a notable surplus of long-term care facility occupancy was no longer evident at the national level. Conversely, the number

of available beds in long-term care facilities in the majority of the aforementioned regions decreased.

In the pre-pandemic period (2018), significant overcrowding was observed in Ingushetia, the Chechen Republic, the Moscow and Orel oblasts. Consequently, the extreme overcrowding that occurred during the pandemic period in care facilities in the Republics of Ingushetia, Tatarstan, Chechen Republic, Moscow and Orel oblasts had a markedly adverse impact on the transmission of the coronavirus within these facilities.

Discussion and conclusion

1. Structure, Number, and Capacity of Long-Term Care Facilities

Of all long-term care facilities (for adults and for children), approximately nine out of ten are care facilities for adults (including the elderly and individuals with disabilities). Over the past decade, the total number of long-term care facilities has been approximately 1,500.

During the Coronavirus pandemic, the average capacity of care facilities for adults was approximately twice that of care facilities for children. The average number of long-term care beds per care facility (average capacity) remained relatively consistent before and during the pandemic.

2. A comparative analysis of the utilization of various long-term care facilities.

2.1 The number of adult residents in long-term care facilities of varying types before and during the pandemic is presented herewith.

During the Coronavirus pandemic (2020), the risk of infection was elevated in the following types of care facilities due to a higher concentration of residents: gerontological psychiatric centers, psychoneurological boarding schools, residential homes for war and labor veterans, gerontological centers, and residential homes for the elderly and disabled.

2.2. Increase in the number of residents (adults) of residential care facilities with the onset of the pandemic.

Residents of small-capacity residential homes, mercy homes, psychoneurological boarding schools, gerontological centers, special residential homes, special homes for the elderly living alone, where the average number of residents exceeded the pre-pandemic level during the pandemic, had an increased risk of coronavirus infection.

3. Aggregated occupancy rates in long-term care facilities in Russia.

Long-term care facilities for the elderly and disabled (adults) were overcrowded in some periods before the pandemic (2017-2018): the aggregate number of residents exceeded the number of official places. During the coronavirus pandemic, these care facilities were not overcrowded (in terms of national aggregates). This did not result in additional risks of coronavirus infection.

In contrast, care facilities for children with disabilities both before and during the coronavirus pandemic were overcrowded (in terms of national aggregates). Consequently, overcrowding in these care facilities was an additional risk factor for coronavirus infection.

4. Non-compliance with standards for the provision of floor space for residents.

In long-term care facilities for adults, non-compliance with the established norms was observed in a number of settings, including psychoneurological boarding schools, special boarding homes, and social and health centers. The advent of the coronavirus pandemic precipitated a notable deterioration in the compliance with this standard in small-capacity residential homes and social and health centers. In long-term care facilities for children, both preceding and during the pandemic, there was a failure to comply with the norms for the provision of floor space. Consequently, the excessive concentration of residents due to the failure to comply with the norms of floor space provision constituted an additional risk factor for coronavirus infection.

5. A summary of the factors that increase the risk of exposure to the novel coronavirus (2019-nCoV) in different types of adult care facilities.

All types of adult residential care facilities were exposed, to a greater or lesser extent, to an increased risk of infection with the novel coronavirus (SARS-CoV-2) during the global pandemic. These factors included (A) a high average number of residents, (B) an increase in the number of residents during the pandemic, and (C) a non-compliance with the standard for the provision of floor space. These risk factors were particularly prevalent in psychoneurological boarding schools for adults and special boarding homes.

In certain types of care facilities, including gerontopsychiatric centers, psychoneurological boarding schools, residential homes for war and labor veterans, gerontological centers, and residential homes for the elderly and

disabled, the risk of coronavirus infection was heightened during the pandemic due to a higher concentration of residents (factor A).

The risk of coronavirus infection was elevated among residents of small-capacity boarding homes, mercy homes, psychoneurological boarding homes, gerontological centers, special boarding homes, and special homes for the elderly living alone, where the average number of residents exceeded the pre-pandemic level during the pandemic (factor B).

Furthermore, an excessive concentration of residents in all types of care facilities due to non-compliance with the standard for the provision of floor space (factor C) constituted an additional risk factor for coronavirus infection.

6. Regions: occupancy of places in long-term care facilities before and during the coronavirus pandemic.

6.1 The structure of regions by level of occupancy in long-term care facilities.

At the outset of the coronavirus pandemic in 2020, 12% of the country's regions were experiencing overcrowding in long-term care facilities, which had an adverse impact on the implementation of measures to prevent the emergence and spread of the coronavirus infection.

6.2 The issue of overcrowding in long-term care facilities.

At the onset of the coronavirus pandemic (2020), disparities between regions reached a maximum level in comparison to the pre-pandemic and late-pandemic periods.

The extreme overcrowding in care facilities in the Republics of Ingushetia, Tatarstan, Chechen Republic, Moscow, and Orel Oblast during the pandemic had

a markedly deleterious impact on the spread of the coronavirus infection in these regions.

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