

REGIONAL DISPARITIES IN THE CZECH SOCIAL SERVICES WORKFORCE: EVIDENCE FROM 2023 ADMINISTRATIVE MICRODATA AT THE NUTS3 LEVEL

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Abstract

This paper examines regional and generational characteristics of the Czech social services workforce using 2023 administrative microdata from the Ministry of Labour and Social Affairs, linked to demographic denominators at the NUTS 3 level. Applying descriptive statistics and k-means clustering, it provides a comprehensive comparison of workforce profiles against the general population and identifies regional typologies based on employee density, age gap, and gender composition. The analysis documents substantial heterogeneity across regions in employee density, average age, and generational composition, while also confirming that the sector remains strongly feminised. Distinct regional profiles emerge, including outliers where employee density and age structure deviate markedly from the national pattern. These findings deepen the understanding of demographic and generational dynamics in the sector and offer an evidence base for cohort-sensitive workforce planning and region-specific policy measures. In practical terms, the results can inform regional workforce planning and HR strategies aimed at improving sustainability and equity in social services provision.

Keywords: Social Services Workforce, Regional Disparities, Generational Change, Workforce Sustainability, Czech Republic

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Introduction

Population ageing in the Czech Republic is accelerating, yet public systems remain insufficiently prepared for its consequences. Policy debates have largely centred on pension reform, while the implications for long-term care and social services have received comparatively limited attention, even though the pressures on these systems are likely to be greater than those on the pension scheme (Průša, 2021). According to Pavlík *et al.* (2024), regional projections to 2035 show population growth only in Hlavní město Praha and the Středočeský kraj, while all other NUTS 3 regions are expected to decline, which creates distinct baseline conditions for workforce planning in social services. The same source projects a sharp rise in the population aged 80 and over, increasing from approximately half a million people in 2024 to just under 700,000 in 2030 and to more than 800,000 in 2035. This trajectory will alter both the volume and the composition of long-term and community-based care, and it indicates that capacity expansion and workforce pipelines should be planned immediately rather than postponed. These patterns justify an analytical focus at the NUTS 3 level, since regional authorities are responsible for ageing strategies and require region-specific evidence for workforce planning. According to the Strategic Framework for the Preparation for Social Ageing 2021–2025, population ageing requires changes beyond pensions, including accessible and locally available social and health services, integrated long-term and palliative care, and adequate staffing and remuneration that match demographic development (MLSA, 2021).

In the Czech context there has been a consistent policy and HR orientation towards prolonging the tenure of experienced workers by adapting working conditions and deploying supportive interventions. Empirically, however, organisational uptake of age-management practices remains limited, with fewer than one third of organisations reporting structured initiatives, benefits concentrated in retention and motivation, and barriers including a lack of expertise as well as time and financial constraints (Urbancová and Fejfarová, 2017). Sector-specific evidence from social services further indicates that HR functions are frequently performed by directors rather than dedicated HR staff, that formal career maps and career structures are rarely used, and that cooperation with educational institutions in recruitment is limited,

which together suggests weak entry pipelines and constrained professional development systems for frontline roles (Pacáková *et al.*, 2023). Commonly recommended measures include flexible scheduling with reduced or shared contracts and predictable rosters, ergonomic adjustments to workplaces and equipment, calibrated work pace and task redesign such as job carving and rotation, structured training and continuous upskilling, mentoring and reverse mentoring, workplace health promotion and routine assessment of work ability using the Work Ability Index, age-inclusive recruitment and onboarding, and supported return-to-work pathways after periods of care or illness (Cimbálníková *et al.*, 2011; Cimbálníková *et al.*, 2012; Cimbálníková *et al.*, 2014). These measures are established at individual, organisational and national levels and aim to sustain the employability of the 50+ workforce in the face of demographic ageing.

Regional evidence from the Moravian-Silesian Region further substantiates these challenges. The region's medium-term plan identifies factors associated with declining interest in social-care work, including low occupational prestige, low pay, difficulties retaining qualified staff and early programme drop-out. In response, the plan prioritises raising the prestige of social work and social services, public awareness and destigmatisation, closer cooperation with educational institutions, and the alignment and expansion of practice-based training for students. It also highlights measures that may increase interest in the field, such as improvements in remuneration, employee support and motivational schemes, shared jobs, and targeted preparation of prospective workers. These region-level actions underscore why workforce sustainability must be addressed at the NUTS 3 level and why capacity expansion and entry pipelines require immediate attention (Moravskoslezský kraj, 2023).

Research on generational differences in the workforce highlights that age cohorts differ not only in demographic structure but also in values, motivation and work expectations (Costanza, 2021; Keepnews, 2010). Generational trajectories affect opportunities for training and career development, with older workers often facing path dependency in skill acquisition and reduced access to training (Turek, 2021). At the same time, workplace policies that are supportive of employees with caregiving responsibilities are increasingly recognised as a precondition for sustaining participation across different life stages (Lorenz, 2021). These insights provide a framework for analysing the Czech social services workforce, where ageing, feminisation and generational change intersect in shaping long-term sustainability.

The analysis is conducted at the NUTS 3 level because Czech regions prepare and implement strategies for population ageing and thus require differentiated, region-specific evidence to inform workforce planning in social services. The strategic framework explicitly situates responsibilities across levels of governance, with competences divided at regional and local levels between regions and municipalities, which further motivates our regional lens (MLSA, 2021). At the European level, these national priorities intersect with a broader policy shift.

At the EU level, the European Care Strategy (FEPS and FES, 2023) and the accompanying Council Recommendations on ECEC and long-term care underscore workforce availability and quality as core conditions for equitable access to care. Positioning Czech regions within this framework motivates our NUTS 3 lens and the comparative indicators used below.

Despite growing policy attention to population ageing and the expansion of social services, the Czech evidence base remains limited in three respects. First, existing studies rarely link administrative microdata on social services employees to population denominators at the NUTS 3 level, which would allow regionally comparable indicators and risk profiles (Pavlík *et al.*, 2024). Second, the generational structure of the workforce has not been examined in a regional context, even though organisational practice still focuses on retaining workers aged 50+ and the uptake of age-management measures remains modest (Cimbálníková *et al.*, 2011; Cimbálníková *et al.*, 2012; Cimbálníková *et al.*, 2014; Urbancová and Fejfarová, 2017). Third, sector-specific analyses that translate empirical patterns into actionable workforce planning guidance are scarce, and recent evidence from social services points to weak entry pipelines and limited HR capacity for structured career development (Pacáková *et al.*, 2023). This paper addresses these gaps by linking administrative microdata to NUTS 3 denominators, applying a generational lens to describe regional patterns, and deriving region-specific recommendations for recruitment, retention and knowledge transfer in social services, in line with national strategy priorities (MLSA, 2021).

The aim of this paper is to analyse data on employees in social services across Czech regions in order to identify underlying trends, to determine whether significant differences exist between regions or whether patterns are uniform nationwide, and to explore whether some regions face particularly critical challenges requiring preventive measures or, conversely, exhibit positive examples that could be replicated elsewhere. To achieve this aim, the paper formulates the following research questions.

Research questions:

- RQ1: How do key workforce indicators vary across regions in the Czech Republic's social services sector?
- RQ2: What is the generational structure of the social services workforce, and how does it differ across regions?
- RQ3: Do regions exhibit discernible patterns or similarities in workforce characteristics that allow for meaningful grouping or typologies?

Guided by these questions, the following hypotheses were formulated.

Hypotheses:

- H1a: Hlavní město Praha has the highest employee density (per 1,000 inhabitants).
- H1b: Hlavní město Praha's workforce is younger on average.
- H2a: Generation X is the dominant cohort nationally.
- H2b: Hlavní město Praha has higher shares of Generations Y and Z than other regions.
- H3: Regions that have historically been affected by youth out-migration (Ústecký, Liberecký and Moravskoslezský kraj) display a common workforce profile that differs systematically from the remaining regions.

The remainder of this paper is structured as follows. Section 2 details the methodology, including data sources (administrative microdata from the Ministry of Labour and Social Affairs and NUTS 3 denominators), data preparation, variable definitions, and analytical methods (descriptive comparisons and k-means clustering). Section 3 presents the results, reporting regional indicators, generational profiles, and the clustering typology. Section 4 provides the discussion and conclusion, linking the findings to workforce dynamics and policy, offering cluster-informed recommendations, and outlining limitations and avenues for future research.

Methodology

An outline of the study design and analytical workflow is provided in this section. Administrative microdata on social services employees obtained from the Ministry of Labour and Social Affairs (MLSA), together with NUTS 3 population denominators used for benchmarking, are described. Indicators derived from these sources (e.g., employees per 1,000 inhabitants, average age, age gap, female share, and generational composition) are defined. The analytical procedures are detailed, including descriptive comparisons and a k-means clustering of regions based on standardised features, together with the criteria used to select the number of clusters. Finally, the software stack and reproducibility setup are summarised.

Data Sources and Study Population

Administrative microdata on employees in social services were obtained from the Ministry of Labour and Social Affairs (MLSA) for the reference period of calendar year 2023. The records capture all individuals reported by providers as employed at any point during 2023 (i.e., not a single-day snapshot). The raw dataset contained 220,148 individual employee records with the following fields: year of birth, sex, service (provider) for which the employee works, region in which the service is registered, highest attained education, years of professional experience, tenure in the current employment relationship, contract fraction (workload), and hours of training completed during 2023. For the purposes of this paper, the analysis relies only on the subset of fields required to derive regional headcounts, age-based indicators, generational and gender composition, and the provider's region of registration.

Limitations of these data are inherent to their administrative and cross-sectional nature. Records identify employees by the region in which the provider is registered, not where services are actually delivered, so within-region deployment and cross-border commuting cannot be observed. Employees of services registered directly under the Ministry of Labour and Social Affairs likewise cannot be geographically reassigned. The 2023 snapshot does not capture dynamics (entries/exits, mobility) and does not allow causal inference. Although basic fields (e.g., sex, year of birth) are comprehensive, potential reporting inconsistencies and the absence of wage or vacancy information constrain explanatory depth. All indicators are therefore interpreted at the NUTS 3 level as benchmarking metrics rather than precise measures of local service capacity.

Data Preparation

Preprocessing was carried out in Google Colab (Python environment). Exactly one employee record lacked a valid year of birth and could not be assigned an age or a generational cohort; this record was removed. Employees were attributed to one of the 14 NUTS 3 regions according to the region in which the provider is registered. Employees of services registered directly under MLSA were retained as a separate category because their actual workplace distribution across regions is not captured in the administrative system. After cleaning, the analytic dataset comprised 220,147 employees (from an initial 220,148).

Variable Definitions

Unless noted otherwise, indicators are computed at NUTS 3 and use total population (not sex- Unless noted otherwise, indicators are computed at NUTS 3 and use total population (not sex-specific) on the denominator or benchmark side. Employees per 1,000 inhabitants are computed as the headcount of social services employees divided by the total regional population, multiplied by 1,000.

I: Overview of indicators, definitions, units, sources, and reporting level

Indicator	Definition	Unit	Source	Reporting level	Indicator
Employees per 1000 inhabitants	Number of registered employees in social services per 1,000 inhabitants in the region	persons per 1,000 inhabitants	MLSA (2023)	NUTS 3	Employees per 1000 inhabitants
% Women (employees)	Share of women among employees in social services	%	MLSA (2023)	NUTS 3	% Women (employees)
% Women (population)	Share of women in the general population	%	ČSÚ (2023)	NUTS 3	% Women (population)
Average age (employees)	Mean age of employees in social services (calculated from year of birth → 2023)	years	MLSA (2023)	NUTS 3	Average age (employees)
Average age (population)	Mean age of regional population	years	ČSÚ (2023)	NUTS 3	Average age (population)
Age gap	Difference between average age of employees and population (employees – population)	years	Derived variable	NUTS 3	Age gap
Women gap	Difference between female share in employees and population (employees – population)	percentage points	Derived variable	NUTS 3	Women gap
Cluster assignment	Cluster label assigned based on k-means analysis of 'Employees per 1000 inhabitants', 'Age gap', and 'Women gap' variables	categorical (0–4)	Own analysis	NUTS 3	Cluster assignment

Source: Own processing based on Ministry of Labour and Social Affairs (2023) and Czech Statistical Office (2023)

Average age of employees is the mean of individual ages in each region, where age equals 2023 minus year of birth; an end-of-year convention is adopted for comparability across regions, and employees who worked only part of the year are included if active at any time in 2023. Average age of the population is the mean age of all residents in the region. The age gap is defined as average age of employees minus average age of the population, expressed in years. The share of women among employees is the percentage of female employees out of all employees in the region.

Tab. I provides an overview of indicators, definitions, units, sources, and reporting level used in the analysis.

Generational cohorts were derived from year of birth as follows: Silent Generation (1928–1945), Baby Boomers (1946–1964), Generation X (1965–1980), Generation Y (1981–1996), and Generation Z (1997–2015). Generational cut-offs are not universally standardised in the literature and may vary or overlap across sources. The above operational definition was pre-specified within the SGS2025 project framework to support comparability across analyses; all substantive results reported here are interpreted with this convention in mind.

For clustering only, a women gap variable was constructed as the percentage of women among employees minus the percentage of women in the regional population; the population sex breakdown is not used in descriptive results, only in this derived feature. Employee counts and average employee age come from MLSA microdata; population denominators, population average age, and population sex composition (where needed for the women gap) come from the Czech Statistical Office Population by Age and Sex, 2023 at NUTS 3.

Analytical Methods

Descriptive statistics and cross-regional comparisons (employees per 1,000 inhabitants, average ages, age gaps, female share, generational composition) were produced in Python using pandas and numpy, with visualisations in matplotlib and seaborn. For the clustering analysis, k-means clustering (scikit-learn) was used to group regions by similarity in workforce structure. Three features were included: employees per 1,000 inhabitants, age gap, and women gap. All features were standardised to z-scores using StandardScaler prior to clustering.

The number of clusters was selected by inspecting the elbow curve of inertia for k from 2 to 7 and by maximising the silhouette score; this procedure yielded a five-cluster solution that balanced fit and interpretability. Clustering was performed on the 14 regions only; the separate MLSA-registered category was excluded. Randomness was controlled with random_state set to 42 and n_init set to 10.

K-means was chosen for its interpretability and suitability in a small-N regional comparison (14 regions) using continuous, standardised indicators. After variables were z-scored, Euclidean distances became comparable across features and centroids provided transparent, policy-readable profiles (density, age gap, women gap).

Compared with hierarchical clustering, sensitivity to the choice of linkage is avoided and, with fixed initialisation settings (random_state and n_init), stable and reproducible partitions are obtained. Parameter tuning for density-based segmentation by DBSCAN is difficult to calibrate with such a small sample, and distributional assumptions required by Gaussian mixture models are not imposed. This balance of simplicity, transparency and reproducibility is taken to render k-means appropriate for the typology exercise.

Software and Reproducibility

All data preparation, analysis and plotting were conducted in Google Colab with Python libraries pandas, numpy, scikit-learn, matplotlib and seaborn.

Results

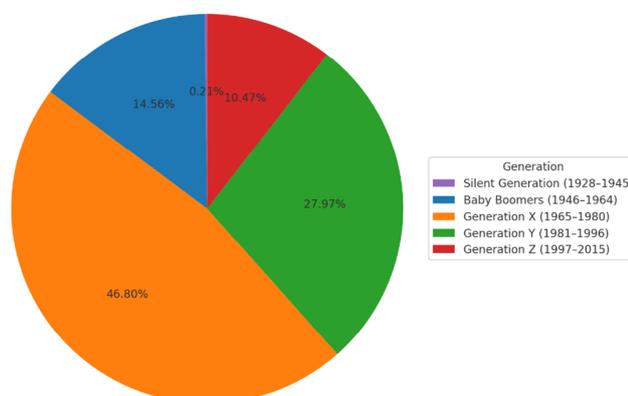
This section presents the main findings of the regional analysis of the social services workforce in the Czech Republic. The results provide an overview of key workforce characteristics and their spatial distribution, highlighting regional variation in employee density, age structure, gender composition and generational patterns. The analytic sample consists of 220,147 employees, distributed across generational cohorts from the Silent Generation to Generation Z. Descriptive statistics are summarised in Tab. II, followed by a set of visualisations that illustrate spatial patterns, generational structures and the results of clustering analysis across regions.

The analytic sample of 220,147 employees distributes across generational cohorts as follows:

- Silent Generation (1928–1945): 455 (0.21%);
 - Baby Boomers (1946–1964): 32,053 (14.56%);
 - Generation X (1965–1980): 103,027 (46.80%);
 - Generation Y (1981–1996): 61,568 (27.97%);
 - Generation Z (1997–2015): 23,044 (10.47%).
- Taken together, these patterns indicate a workforce anchored in mid-career cohorts, with Generation X forming the largest share nationally; Hypothesis H2a is therefore confirmed.

Fig. 1 displays a pie chart of generational shares in the workforce, with Generation X (46.80%), Generation Y (27.97%), Baby Boomers (14.56%), Generation Z (10.47%) and the Silent Generation (0.21%). Many members of Generation Z are still in education and below typical entry ages for social-care roles, which helps explain their comparatively low representation. From a labour-supply perspective this composition implies concentrated exposure to retirement dynamics in the near and medium term. Baby Boomers will largely exit the labour force within the next 10 to 15 years, so their current contribution should be viewed as transitory rather than sustainable. Generation X is beginning to reach statutory retirement ages and a gradual reduction in full-time availability is likely through partial retirement, reduced hours and increased caregiving or sickness leave. These cohort shifts will lower effective labour input unless offset by higher inflows and faster onboarding of younger workers. At the same time, a rising share of early-career staff increases supervision and mentoring demand, which needs to be planned to avoid productivity losses. The profile therefore signals the need for targeted recruitment from Generations Y and Z, retention measures that support mid-career carers and formal knowledge-transfer mechanisms to preserve tacit skills as older cohorts depart.

Generational composition of the social services workforce (Czech Republic, 2023)



1: Generational composition of the social services workforce

Source: Ministry of Labour and Social Affairs (2023); own calculations

II: Comparison of Workforce and Population Characteristics by Region

Region	Employees per 1000 inhabitants	Women (%)	Average age employee	Avg age population	Age gap	Cluster
Česká republika	19.45	85.4	45.3	42.5	2.8	-
Hlavní město Praha	28.23	81.1	43.0	41.2	1.8	2
Jihomoravský kraj	16.36	86.0	45.1	42.2	2.9	1
Jihočeský kraj	20.69	86.9	44.6	42.8	1.8	0
Karlovarský kraj	15.85	83.7	46.5	43.1	3.4	4
Kraj Vysočina	20.87	87.6	44.2	42.8	1.4	0
Královéhradecký kraj	18.34	86.4	44.5	43.2	1.3	0
Liberecký kraj	14.78	87.2	47.0	42.4	4.6	3
Moravskoslezský kraj	19.87	85.3	45.8	43.0	2.8	1
Olomoucký kraj	20.75	83.7	45.2	43.0	2.2	1
Pardubický kraj	22.81	87.1	44.5	42.4	2.1	0
Plzeňský kraj	13.21	82.4	45.0	42.5	2.5	1
Středočeský kraj	16.27	87.0	46.2	41.0	5.2	3
Zlínský kraj	21.48	86.9	46.5	43.4	3.1	1
Ústecký kraj	22.74	84.0	46.1	42.4	3.7	1

Source: Ministry of Labour and Social Affairs (2023); Czech Statistical Office (2023); own calculations

Tab. II presents indicators of the social services workforce for the whole Czech Republic and for each region (NUTS 3). The table reports employees per 1,000 inhabitants, the share of women among employees, the average age of employees, the average age of the general population, the resulting age gap (employees minus population) and the assigned cluster category.

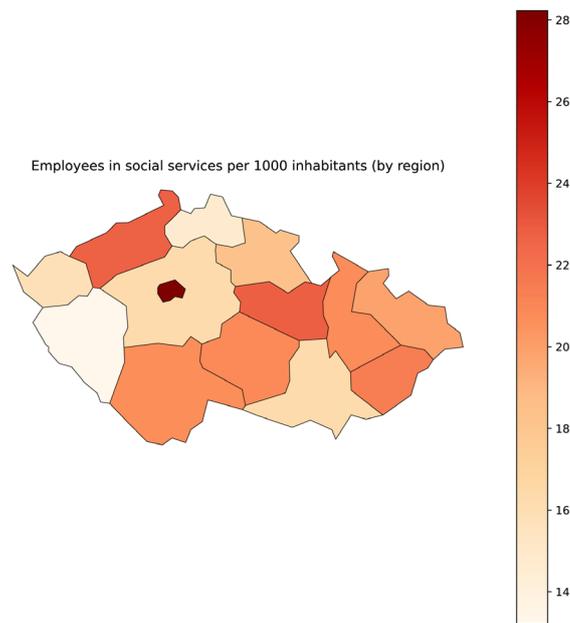
The values point to marked cross-regional differences. Employee density ranges from about 13 in Plzeňský kraj to over 28 in Hlavní město Praha. Workforce age varies from 43.0 years (Hlavní město Praha) to 47.0 years (Liberecký kraj), and the age gap spans 1.3–5.2 years, with the largest gap in Středočeský kraj, consistent with its tight linkage to the Hlavní město Praha labour market. Across regions, the sector remains highly feminised (roughly 81–88%).

The cluster column groups regions with similar combinations of employee density and age gap, offering a concise typology that can support region-specific HR and planning choices rather than a one-size-fits-all approach.

Fig. 2 displays the number of social services employees per 1,000 inhabitants by region. Values decrease from Hlavní město Praha (28.23) to Plzeňský kraj (13.21) as follows: Pardubický (22.81), Ústecký (22.74), Zlínský (21.48), Kraj Vysočina (20.87), Olomoucký (20.75), Jihočeský (20.69), Moravskoslezský (19.87), Královéhradecký (18.34), Jihomoravský (16.36), Středočeský (16.27), Karlovarský (15.85), Liberecký (14.78), Plzeňský (13.21).

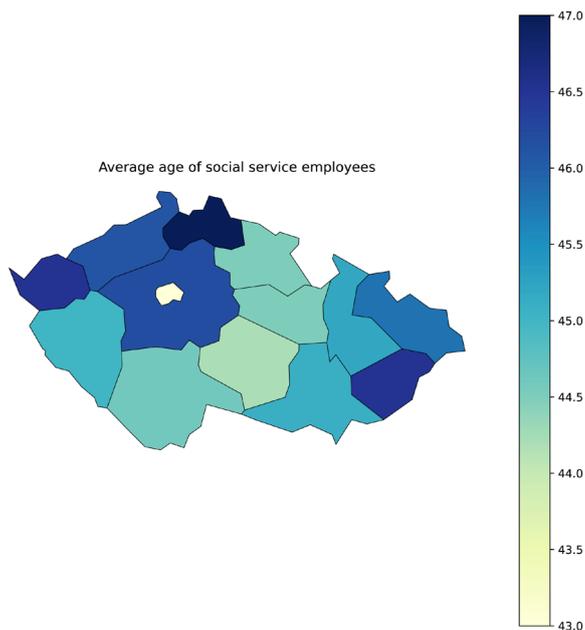
The Středočeský kraj is structurally intertwined with the Hlavní město Praha labour market. Regional planning documents emphasise strong daily commuting for work and study, metropolitan coordination with Hlavní město Praha, and cross-regional use of services, including cases where providers registered in Hlavní město Praha operate on Středočeský kraj territory. These conditions plausibly thin local recruitment pools as younger and more mobile workers take jobs in Hlavní město Praha, while administrative registration may attribute some employees to Hlavní město Praha rather than to the locations where services are delivered in the Středočeský kraj. This combination offers a coherent explanation for the high employee density observed in Hlavní město Praha relative to its surrounding Středočeský kraj (Středočeský kraj, 2022; Středočeský kraj, 2025).

In the Ústecký kraj, regional planning documents report staffing shortages in residential services and note outflows of personnel linked to employment opportunities in Germany, alongside high turnover in direct care roles (Ústecký kraj, 2021). In the Liberecký kraj, an outflow of younger workers towards Hlavní město Praha or Germany can be inferred, which would further depress local employee density. In the Plzeňský kraj, an outflow towards Germany can be inferred in light of cross-border commuting corridors and higher wages abroad, which is consistent with comparatively lower employee density. In the Jihomoravský kraj, an outflow of younger workers towards Austria can be inferred given cross-border connectivity, which would constrain regional staffing levels. Taken together, these patterns confirm Hypothesis H1a that Hlavní město Praha has the highest employee density.



2: *Employees per 1,000 Inhabitants by Region*

Source: Ministry of Labour and Social Affairs (2023); Czech Statistical Office (2023); own calculations



3: *Average Age of Social Services Employees by Region*

Source: Ministry of Labour and Social Affairs (2023); Czech Statistical Office (2023); own calculations

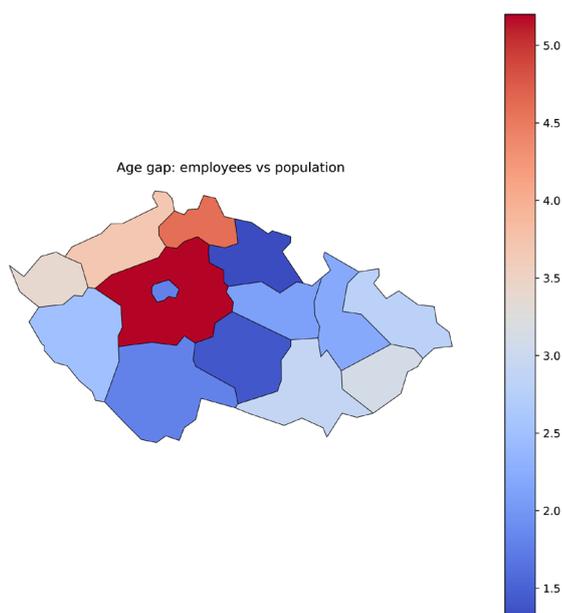
Fig. 3 presents the average employee age by region. Values increase from Hlavní město Praha (43.0) through Kraj Vysočina (44.2), Pardubický (44.5), Královéhradecký (44.5), Jihočeský (44.6), Plzeňský (45.0), Jihomoravský (45.1), Olomoucký (45.2), Moravskoslezský (45.8), Ústecký (46.1), Středočeský (46.2), Karlovarský (46.5), Zlínský (46.5), up to Liberecký (47.0).

The relatively low average age observed in Hlavní město Praha was anticipated and H1b is thereby confirmed that Hlavní město Praha's workforce is younger on average. Kraj Vysočina is close to Hlavní město Praha in this metric, reinforcing the pattern of relatively younger workforces in these territories. By contrast, the high average ages in Liberecký, Ústecký and Karlovarský are consistent with lower employee density reported in the employee-per-capita chart, and are interpreted as the imprint of outward mobility among the two youngest cohorts. In Zlínský kraj, the elevated workforce age is explained by the region's older general population documented (see Tab. II), which is reflected in the age structure of employees in social services.

Fig. 4 shows the age gap (average employee age minus average population age) by region, ranging from 1.3 years in Královéhradecký kraj to 5.2 years in Středočeský kraj; other high values occur in Liberecký (4.6) and Ústecký (3.7), while Kraj Vysočina (1.4) and Hlavní město Praha (1.8) sit at the lower end.

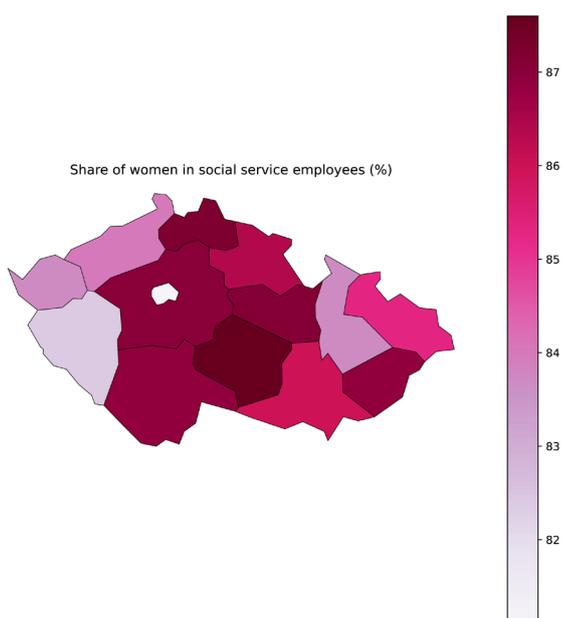
The very large gap in Středočeský kraj is plausibly explained by its integration with the Hlavní město Praha labour market and by registration asymmetries that shift headcounts to Hlavní město Praha. Elevated gaps in Liberecký, Ústecký and Karlovarský are consistent with outward mobility among younger cohorts, which leaves an older incumbent workforce. Small gaps in Královéhradecký and Kraj Vysočina indicate closer alignment between workforce and resident age structures.

Fig. 5 shows the regional distribution of the proportion of women among social services employees. The female share ranges from 81.1% in Hlavní město Praha to 87.6% in Kraj Vysočina. Higher proportions are also observed in Liberecký kraj (87.2%), Pardubický kraj (87.1%), Středočeský kraj (87.0%), Jihočeský kraj (86.9%),



4: Age Gap between Employees and the General Population by Region

Source: Ministry of Labour and Social Affairs (2023); Czech Statistical Office (2023); own calculations



5: Proportion of Women among Employees by Region

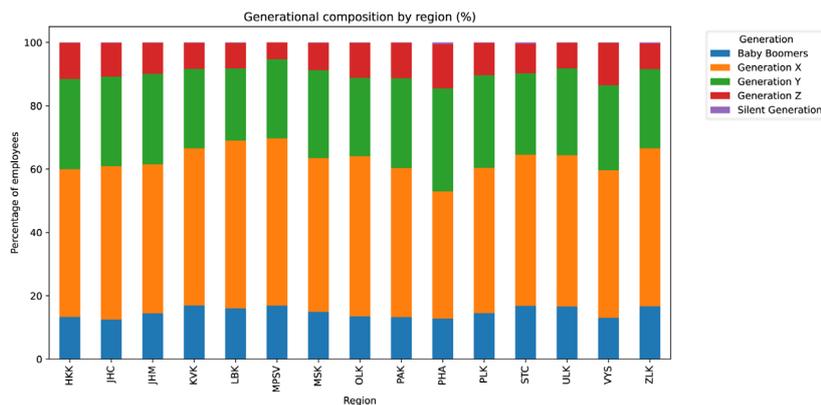
Source: Ministry of Labour and Social Affairs (2023); Czech Statistical Office (2023); own calculations

and Zlínský kraj (86.9%). Regions with intermediate values include Královéhradecký kraj (86.4%), Jihomoravský kraj (86.0%), and Moravskoslezský kraj (85.3%). Lower proportions are found in Ústecký kraj (84.0%), Karlovarský kraj (83.7%), Olomoucký kraj (83.7%), Plzeňský kraj (82.4%), and Hlavní město Praha (81.1%).

The distribution confirms a highly feminised sector in every region, with only a narrow spread between the lowest and highest values. This consistency points to a sector-wide pattern rather than region-specific effects. Given that Kraj Vysočina sits at the upper end of the female share and ranks close to Hlavní město Praha on average employee age (see Fig. 3), the high proportion of women can be read as consistent with a comparatively stronger presence of younger cohorts in its workforce.

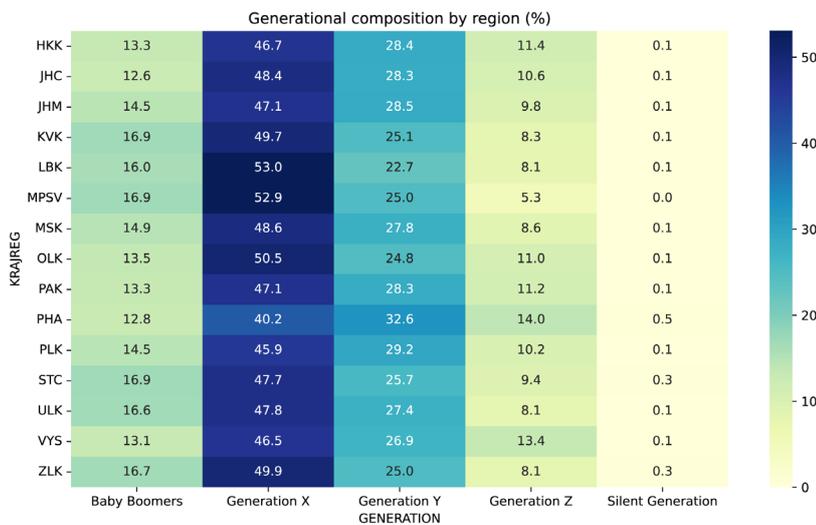
Fig. 6 displays the cohort breakdown of social services employees across regions: Silent Generation (≤ 1945), Baby Boomers (1946–1964), Generation X (1965–1980), Generation Y (1981–1996) and Generation Z (1997–2015). In addition to the 14 regions, the figure also includes employees of services registered directly under the Ministry of Labour and Social Affairs.

Fig. 7 indicates that Generation Z is comparatively well represented in Kraj Vysočina (13.4%), second only to Hlavní město Praha (14.0%). This pattern is consistent with Vysočina's planning priorities, which emphasise human-resources development and staff education and call for cooperation with schools and other partners to sustain skills pipelines and practice linkages (Kraj Vysočina, 2023; Kraj Vysočina, 2021; Kraj Vysočina, 2016). At the same time, the high share of Generation Z may also reflect comparatively lower shares of Baby Boomers and Generation X in Vysočina than in several other regions, which could indicate that experienced staff are not being retained as long as elsewhere. If this is due to working conditions or career structures, as discussed in Section 4, improvements in retention could raise employee density and thereby service availability by enabling more clients to be served.



6: Generational Composition of Employees by Region

Source: Ministry of Labour and Social Affairs (2023); own calculations



7: Heatmap of Generational Structure across Regions (including MLSA)

Source: Ministry of Labour and Social Affairs (2023); own calculations

In Hlavní město Praha, the highest presence of younger cohorts is observed, with Generation Y at 32.6% and Generation Z at 14.0%. Hypothesis H2b is therefore confirmed that Hlavní město Praha has higher shares of Generations Y and Z than other regions.

The highest shares of Generation X are observed in Liberecký kraj (53.0%), MLSA-registered services (52.9%), Olomoucký kraj (50.5%) and Zlínský kraj (49.9%). For MLSA-registered services, this profile can be interpreted as a function of expert and policy roles that support legislative preparation and strategic design, which is consistent with the very low share of Generation Z (5.3%) and does not, by itself, imply a workforce risk. In Liberecký, Olomoucký and Zlínský kraj, however, such concentration in Generation X signals elevated replacement risk as this cohort approaches retirement, with potential implications for service continuity unless offset by strengthened recruitment and retention of younger staff.

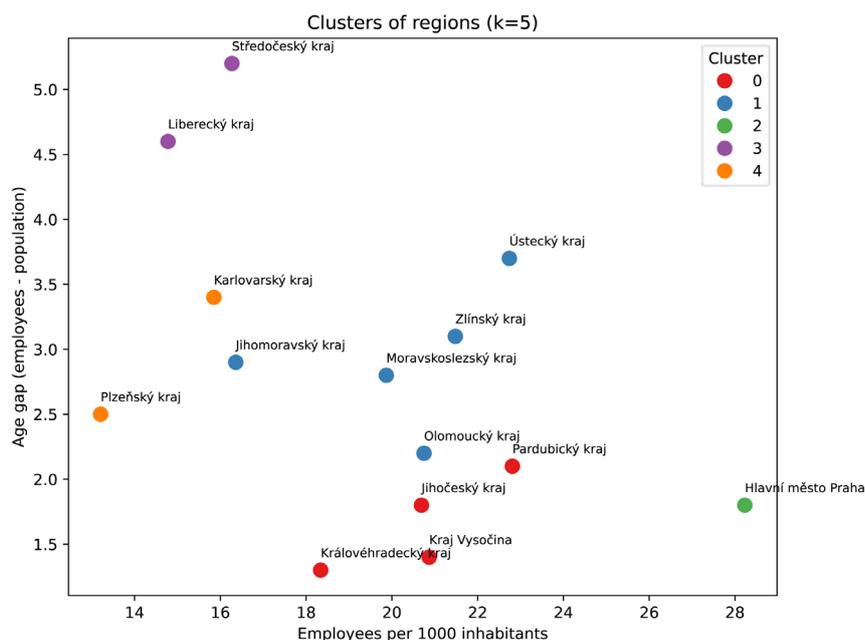
Having described the key workforce indicators, the analysis next examines how regions group by their combined profiles using k-means clustering.

Fig. 8 presents the results of regional clustering based on two indicators: the age gap between social services employees and the general population, and the number of employees per 1,000 inhabitants. Five clusters were identified, grouping together regions with similar combinations of these two measures.

- Cluster 0: Jihočeský kraj, Kraj Vysočina, Královéhradecký kraj, Pardubický kraj.
- Cluster 1: Jihomoravský kraj, Moravskoslezský kraj, Olomoucký kraj, Ústecký kraj, Zlínský kraj.
- Cluster 2: Hlavní město Praha.
- Cluster 3: Liberecký kraj, Středočeský kraj.
- Cluster 4: Karlovarský kraj, Plzeňský kraj.

Regions with a higher employee density and smaller age gap are positioned towards the upper left of the plot, whereas regions with lower employee density and larger age gaps appear towards the lower right. The clustering provides a concise visual summary of regional workforce patterns. The clusters illustrate typologies of regional workforce profiles that can serve as a practical basis for planning and decision-making in social services.

Hypothesis H3 is not confirmed. Ústecký, Liberecký and Moravskoslezský kraj do not form a distinct cluster; their workforce profiles do not separate systematically from the remaining regions when indicators are considered jointly. By contrast, Hlavní město Praha forms a standalone cluster (cluster 2, bottom right), clearly detached from the rest of the country. This is consistent with H1a that Hlavní město Praha has the highest employee density and with H1b that its workforce is younger on average, reflecting a deep metropolitan labour market and strong inward pull on early-career staff. In contrast, Středočeský and Liberecký kraj appear together in cluster 3 at the top left, which is consistent with outward commuting of younger cohorts towards Hlavní město Praha and the associated thinning of local staffing pools.



8: Regional Clustering by Workforce Age Gap and Employees Density

Source: Ministry of Labour and Social Affairs (2023); Czech Statistical Office (2023); own calculations

Discussion and Conclusion

This section interprets the empirical results through demographic structure, labour market geography and human resource management frameworks, and then translates them into planning choices. Subsection 4.1 describes regional disparities that motivate a differentiated approach. Subsection 4.2 examines generational composition and the caregiving context and shows how these patterns shape supervision needs, entry pipelines and knowledge transfer, with concrete actions to be embedded into the medium-term plans for the development of social services of individual regions and monitored by a minimal set of indicators. Subsection 4.3 uses the cluster typology to prioritise measures under different structural conditions. Subsection 4.4 sets out governance and data responsibilities so that regions can adjust course without uniform national targets. Subsection 4.5 acknowledges limitations and outlines practical research steps that can validate the effects of selected interventions.

Regional Workforce Disparities

Hlavní město Praha stands out on several dimensions that align with the initial expectations. Its employee density is the highest in the country, and its workforce is the youngest on average. These patterns are consistent with the city's broader labour-market pull and the wide range of entry-level roles available. These features help explain the comparatively small age gap observed there. The cohort view complements this picture: Generation X is the dominant cohort nationally, and Hlavní město Praha appears to host relatively larger shares of Generations Y and Z, which fits the city's education infrastructure and graduate inflows. Together, these results are consistent with the expectation that the national profile is X-heavy, with Hlavní město Praha skewing younger in its cohort mix.

In practical terms, the set of indicators functions as regional benchmarks at the NUTS 3 level. Regions above peer averages in employee density but with older workforces would prioritise retention and mid-career upskilling; regions below peer density with lower shares of younger cohorts would emphasise entry pipelines and onboarding. The benchmarks thus provide a comparative signal rather than a precise capacity measure and are intended to inform region-specific HR choices.

On this benchmark basis, wage differentials add further context. According to Czech Statistical Office data as reported in the Analysis of Household Incomes and Expenditures in the Czech Republic, 2023 (MLSA, 2024), average nominal wages in 2023 were highest in Hlavní město Praha and in the surrounding Středočeský kraj, while several peripheral regions were at the lower end. Such differences plausibly strengthen commuter flows and selective retention of younger, more mobile workers in higher-wage labour markets. This helps explain why some neighbouring regions show comparatively smaller shares of younger employees despite having young resident populations: mobile graduates may take jobs in Hlavní město Praha's labour market, narrowing local recruitment pools elsewhere. This mechanism is consistent with the spatial patterns in Figs. 2–4 and the cohort distributions in Figs. 6–7, although causal identification would require dedicated mobility and wage-offer data.

With respect to identifying models worth emulating, it is important to distinguish structural outliers from transferable practices. Hlavní město Praha appears as a systemic outlier in the data: the concentration of higher and higher-vocational education, a wide portfolio of entry-level roles, and above-average wage offers create conditions that cannot be realistically replicated at scale in other regions. Hlavní město Praha therefore does not provide a “scalable template”; rather, individual elements such as formal partnerships with schools, paid placements, and clear entry trajectories are portable and can be adapted in region-appropriate ways.

Special attention is warranted for Středočeský kraj. Its profile is shaped by proximity to the Hlavní město Praha labour market: younger and more mobile workers can commute to Hlavní město Praha, where job variety and pay are higher, which weakens the local recruitment pool in social services. In addition, there is an inherent attribution asymmetry in the administrative records: providers registered in Hlavní město Praha may deliver services on Středočeský kraj territory while their employees are recorded under the Hlavní město Praha registered entity. This is not a removable artefact but a built-in feature of the MLSA registration system; the actual workplace location is not captured and cannot be reconstructed from the available microdata. As a result, regional headcounts may be understated for Středočeský kraj and mirrored upward for Hlavní město Praha. Readers should interpret cross-regional comparisons with this limitation in mind. Taken together, the analysis does not identify any single region that could serve as a fully transferable model for replication; rather, individual elements of practice may be selectively adapted to regional contexts.

The expectation that Ústecký kraj, Liberecký kraj and Moravskoslezský kraj would form a single, shared profile distinct from other regions did not hold. While all three display elevated age gaps, their employee densities differ markedly, indicating greater similarity in the age dimension than in capacity. Heterogeneity of transport connectivity, commuting catchments, provider networks and local job opportunities likely contributes to these differences; testing such mechanisms lies beyond the scope of the present paper.

Generational Composition and Caregiving Context

The generational structure has practical implications that go beyond simple confirmation of expectations. It suggests different planning needs across regions: where older cohorts are more prevalent, replacement pressure is likely to materialise sooner; where younger cohorts are more numerous, supervision and onboarding capacity become more critical. Reading these sectoral patterns alongside household caregiving norms strengthens this interpretation. In the Czech context, home-based family care is commonly preferred. Representative evidence shows that the typical caregiver is a woman aged 45–64, most often caring for a parent (around 37%) or a grandparent (around 18%), with an average weekly care load of about 29 hours; about 11% of caregivers report leaving employment and about 13% report reducing working hours due to care (MLSA, 2024). Given the high feminisation of the workforce and the predominance of Generation X among employees, these figures point to non-negligible risks of temporary exits or reduced availability among mid-career staff in the coming years.

Regional differences in the share of women are smaller than differences in age or density, yet the consistently high feminisation across regions increases the sector's sensitivity to the accumulation of caregiving roles and work–family conflicts. From a capacity-management perspective this supports the need for flexible hours, predictable rostering and re-entry pathways after career breaks to limit the loss of experienced staff (Fig. 5).

Fig. 6 also shows that some regions exhibit relatively higher shares of younger cohorts while others rely more heavily on Generation X. To stabilise the entry pipeline, targeted collaboration with secondary schools and higher vocational schools (health–social tracks) appears warranted, including scholarships, paid placements and dual elements; directing such efforts at Generation Z (and, over time, Generation Alpha) can mitigate the prospective gap as Generation X retires (Fig. 6).

Several regions have already moved in this direction by deepening cooperation with universities and higher vocational schools and by systematising student placements as entry pathways into social services. The Ústí Region's medium-term plan sets a specific objective to involve students and graduates in the social sector and includes measures to expand placements in cooperation with universities and higher vocational schools (Ústecký kraj, 2021). The Moravian-Silesian Region's medium-term plan prioritises raising the prestige of social work and social services, public awareness and destigmatisation, closer cooperation with education providers, and the alignment and expansion of practice-based training for students (Moravskoslezský kraj, 2023). These region-level initiatives are consistent with our findings on weak entry pipelines and support the case for region-specific recruitment strategies.

These generational patterns are consistent with broader evidence on workforce dynamics across sectors. Older workers are valuable but may encounter barriers such as discrimination or exclusion from development opportunities, which can shorten their tenure unless proactive measures are taken (Kunze, 2024; Turek, 2021). Generational values also matter: Millennials and Generation Z are often motivated by pro-social and environmental factors, showing stronger engagement where organisational practices align with these values (Kim, 2016). The predominance of Generation X in Czech social services can therefore be seen both as a strength, due to experience and loyalty, and as a vulnerability, given the limited inflow of younger cohorts. Aligning recruitment, retention and workplace policies with the differing expectations of each generation is thus essential for workforce stability (Costanza, 2021; Lorenz, 2021).

The relationship between average employee age and the age gap is not linear. Some regions combine a relatively older workforce with a comparatively young resident population, producing a larger gap, while others show smaller gaps because both employees and the population are younger. This underscores that capacity planning needs to account for both dimensions jointly rather than treating either age level or the gap in isolation (Figs. 3–4).

A closer look at Liberecký kraj illustrates how these factors can combine into an exposed profile. In Fig. 2, Liberecký belongs among the regions with the lowest employee density. Fig. 3 shows that its workforce is the oldest in the country, and Fig. 4 places the region at the high end of the age-gap distribution (second largest). Fig. 5 indicates a comparatively high female share (87.2%). The cohort evidence in Fig. 7 underscores this pattern: Liberecký records an above-average share of Generation X (53% versus the national average of 46.64%) and below-average shares of Generation Y (22.7% versus 27.97%) and Generation Z (8.1% versus 10.47%). This combination of low employee density, the oldest average age, a large age gap, high feminisation and an X-heavy cohort mix marks Liberecký as one of the most exposed regional profiles in the Czech Republic with respect to near-term replacement pressure. In practical terms, it suggests the need for targeted entry pathways for younger cohorts (placements, scholarships, structured onboarding), flexible work arrangements that reduce exit risk for mid-career staff with care responsibilities, and deliberate knowledge-transfer mechanisms from senior staff to junior teams.

These findings should be incorporated into each region's medium-term plans for social services as time-bound objectives with measurable indicators and clear ownership. Regions should strengthen entry pipelines for Generation Z, and over time Generation Alpha, through partnerships with secondary and vocational schools, funded scholarships and paid placements that convert to contracts within three months.

To reduce early exits among Generation Z and Generation Y, implement structured onboarding with a named mentor and maintain a transparent supervisor-to-junior ratio, tracking retention at six and twelve months. For Generation X and late Baby Boomers, stabilise participation via predictable rostering, flexible fractions and job sharing, supported return-to-work arrangements and targeted ergonomic improvements. With impending retirements, plan knowledge transfer from Generation X to Generations Y and Z using time-boxed handover projects, mentoring allowances and a living procedure library co-authored by senior and junior staff. Ongoing course correction should rely on a small, comparable KPI set such as conversion from placements, six- and twelve-month retention, supervisor load and vacancy fill time so that adjustments remain proportionate to each region's structure without imposing uniform targets.

Cluster Typologies

The clustering translates high-dimensional workforce evidence into a compact, policy-readable typology that can be used as a planning benchmark. Because clusters are defined by employee density and the age gap, they map to intuitive profiles: regions with higher density and smaller gaps can serve as reference cases for stabilisation; regions with lower density and larger gaps indicate priority needs in entry pipelines and mentoring; and mixed profiles point to modular, differentiated HR packages.

In operational terms, cluster-informed recommendations can be framed as follows. High-density, low-gap profiles should focus on sharing recruitment practices, maintaining supervisor capacity, and scaling mentorship. Medium-density, medium-gap profiles should combine targeted school partnerships with structured onboarding and incremental incentives tied to accredited skills. Low-density, high-gap profiles should prioritise scholarships and paid placements for Generation Z, relocation or commuting support, predictable scheduling, and flexible hours to reduce exit risk among Generation X, alongside explicit knowledge-transfer programmes. For unique outliers, a bespoke mix can be calibrated from these menus, guided by local provider networks and commuting patterns rather than by national averages.

This interpretation is consistent with international evidence emphasising that workforce retention requires balancing multiple, sometimes competing, criteria rather than relying on single-factor solutions. For example, Di Caprio *et al.* (2025) show in the healthcare sector that data-driven multicriteria models can help decision makers weigh financial, organisational and individual-level factors when designing retention strategies. Such approaches are directly relevant to social services, where wage differentials, generational expectations and caregiving responsibilities jointly shape employment trajectories.

Policy and Management Implications

These findings have planning relevance. Regions with larger age gaps and lower density may face greater replacement pressure as Generation X retires, especially where the inflow of younger cohorts is weak. Regions with higher density and smaller gaps may offer transferable organisational and staffing practices. The analysis is cross-sectional (2023) and aggregated at NUTS 3; it does not capture within-region heterogeneity and does not establish causality. Even so, combining sectoral evidence with caregiving expectations and wage differentials provides a coherent explanation for several observed patterns and offers an evidence base for targeted workforce planning, particularly where the risk profile is most pronounced.

To translate these comparative insights into an operational tool for decision-makers, the indicators can be formalised as shared regional benchmarks and embedded in a joint HR analytics dashboard maintained by the Ministry of Labour and Social Affairs in partnership with regions. A concise, comparable KPI set would track cohort entry rates (Z, Y), retention at 6/12/24 months, supervisor-to-junior ratios, training uptake and completion, internal mobility, sickness absence and vacancy coverage time. Each region would be positioned against the national distribution and interquartile range, the mean of its cluster peers and its own previous period, enabling routine course correction without imposing uniform targets on structurally different areas. Privacy would be protected by reporting rates and benchmarks rather than individual records and by harmonised metadata (provider registration, service type, contract fraction).

On that basis, a phased set of priorities can be formulated.

- Short-term (0–2 years): Establish targeted partnerships with secondary schools and higher-vocational institutions, offer scholarships and paid placements for Generation Z, and launch structured onboarding and mentoring schemes. In parallel, agree indicator definitions and pilot the dashboard in two contrasting regions (high-density/low-gap versus low-density/high-gap).
- Medium-term (3–7 years): Introduce transparent career ladders, accredited training modules and project-based roles tailored to Generation Y. Expand flexible arrangements (reduced hours, job sharing, predictable rostering) to retain mid-career staff. Scale the dashboard nationwide and add early-warning flags for supervisor bottlenecks and cohorts at risk of exit.
- Long-term (8+ years): Institutionalise knowledge-transfer programmes from Generation X and late Baby Boomers and extend the dashboard with longitudinal indicators (multi-year retention, internal progression), enabling continuous benchmarking of policy changes.

International evidence underscores the value of analytics for monitoring workforce dynamics: dashboards make it possible to visualise key indicators, detect risks early and tailor interventions to local conditions. Embedding such approaches in social services would allow national and regional authorities to track generational entry, early-career retention and supervisor capacity in near real time, thereby operationalising the proposed monitoring framework.

Responsibilities are distributed across actors: regional authorities coordinate workforce planning and convene providers; the Ministry sets standards, definitions and incentive schemes; educational institutions expand social-care tracks and placements; providers implement workplace-level programmes and supply routine data feeds to the dashboard.

Taken together, the generational profiles highlight the urgency of tailored recruitment and retention strategies. Efforts should focus on attracting Generation Z, and subsequently Generation Alpha, through closer collaboration with secondary schools and vocational institutions, supported internships and scholarships. For Generation Y, priorities include flexible working patterns, transparent career development pathways and project-based roles aligned with expectations of autonomy and work–life balance. Without such measures, the forthcoming retirement of Generation X risks leaving a structural gap that younger cohorts, under current trends, are unlikely to fill.

The findings address the guiding questions by documenting non-uniform regional patterns in key workforce indicators (RQ1), describing a generational profile dominated by Generation X with regionally varying shares of younger cohorts (RQ2), and revealing similarities and differences that support a typology of regional profiles rather than a single out-migration pattern (RQ3). These results underpin a cohort-sensitive approach to workforce planning and region-specific measures for recruitment, retention and knowledge transfer, with shared benchmarks and the dashboard providing the comparative infrastructure needed for ongoing monitoring and adjustment.

These findings directly contribute to the SGS2025 project “Exploring the Impact of Generational Changes on the Management of Organisations” by translating cohort patterns into actionable management levers. Beyond these conclusions, the article also aligns with the project’s aims by showing that generational differences in the social-services workforce are not merely statistical artefacts but have practical implications for organisational management. The results highlight the need for generationally differentiated onboarding, tailored training pathways and retention strategies that account for differing expectations around work, career development and work–life balance. In this way, the article provides empirical evidence to guide management practices in social services and offers transferable lessons for other sectors facing similar demographic pressures.

Limitations and Future Research

This study has several limitations. The analysis is based on cross-sectional data for 2023 and therefore cannot capture temporal dynamics in workforce composition. The indicators are aggregated at the NUTS 3 level, which masks within-region heterogeneity and local labour-market conditions. Administrative records identify employees by the region in which their provider is registered rather than by the actual location of service delivery; the true workplace cannot be reconstructed from the microdata. In addition, employees of services registered directly under the Ministry of Labour and Social Affairs cannot be assigned to specific workplaces because this level of detail is not recorded.

Future research should include longitudinal monitoring to detect generational shifts over time, integrate wage and mobility statistics to better explain regional disparities, and complement quantitative analysis with qualitative insights into the motivations and expectations of younger cohorts entering the social-services workforce. Notwithstanding these constraints, the study establishes a robust empirical baseline for longitudinal tracking and cross-regional benchmarking.

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