Çağ Üniversitesi Sosyal Bilimler Dergisi
Cilt 23, Sayı 1, ss.58-68,2026
ISSN:1304-8392
https://dergipark.org.tr/cagsbd

Geliş Tarihi / Received: 10.06.2026
Kabul Tarihi / Accepted: 19.06.2026
Araştırma Makalesi / Research Article

Preparing for Ageing: Healthcare System Capacity and Workforce Adaptation in OECD Countries

Mesude MEDE[1], Ayşegül ERKOÇ[2], Zeliha KÖSE[3]

ABSTRACT: Population ageing has become a major structural challenge for healthcare systems in OECD countries, requiring long-term planning in healthcare workforce, service capacity, and healthcare delivery. This study examines how healthcare systems prepare for demographic ageing by focusing on healthcare workforce capacity, hospital infrastructure, and healthcare utilization. The study uses a panel dataset covering 26 OECD countries over the period 2015–2023. Data were obtained from the OECD and World Bank databases. Population ageing was measured by the proportion of the population aged 65 years and over, while healthcare system preparedness was assessed using physician density, hospital bed capacity, and doctor consultations. GDP per capita and life expectancy were included as control variables. Descriptive statistics, Pearson correlation analysis, pooled OLS regression, and fixed-effects and random-effects models were employed. Hausman test results supported the use of fixed-effects models, and cluster-robust standard errors were applied to address heteroskedasticity. The findings indicate that population ageing is positively and significantly associated with physician density. In contrast, no statistically significant relationship was found between population ageing and hospital bed capacity or doctor consultations. Overall, the results suggest that OECD healthcare systems respond to population ageing primarily through healthcare workforce adaptation, highlighting the importance of strategic healthcare workforce planning.
Keywords: Population ageing, healthcare workforce, health system preparedness, OECD countries, physician density
JEL Code: C23, I18, J11

Yaşlanmaya Hazırlanmak: OECD Ülkelerinde Sağlık Sistemi Kapasitesi ve İş Gücü Uyumu

ÖZ: Nüfusun yaşlanması, OECD ülkelerinde sağlık iş gücü, hizmet kapasitesi ve sağlık hizmet sunumu açısından uzun vadeli planlama gerektiren önemli bir yapısal dönüşüm alanıdır. Bu çalışma, sağlık sistemlerinin demografik yaşlanmaya nasıl hazırlandığını sağlık iş gücü kapasitesi, hastane altyapısı ve sağlık hizmet kullanımı göstergeleri üzerinden incelemeyi amaçlamaktadır. Araştırmada, 2015–2023 dönemini kapsayan 26 OECD ülkesine ait panel veri seti kullanılmıştır. Veriler OECD ve Dünya Bankası veri tabanlarından elde edilmiştir. Nüfus yaşlanması, 65 yaş ve üzeri nüfusun toplam nüfus içindeki payı ile ölçülmüş; sağlık sistemi hazırlığı ise hekim yoğunluğu, hastane yatak kapasitesi ve doktor başvuru sayısı göstergeleri ile değerlendirilmiştir. Kişi başına gayrisafi yurt içi hasıla ve yaşam beklentisi kontrol değişkenleri olarak analize dahil edilmiştir. Çalışmada tanımlayıcı istatistikler, Pearson korelasyon analizi, havuzlanmış OLS regresyon ile sabit ve rassal etkiler modelleri kullanılmıştır. Hausman testi sonuçları sabit etkiler modelinin tercih edilmesi gerektiğini göstermiş, heteroskedastisite nedeniyle küme-robust standart hatalar kullanılmıştır. Bulgular, nüfus yaşlanmasının hekim yoğunluğu ile pozitif ve istatistiksel olarak anlamlı ilişkili olduğunu göstermektedir. Buna karşılık, nüfus yaşlanması ile hastane yatak kapasitesi ve doktor başvuru sayısı arasında anlamlı bir ilişki bulunmamıştır. Sonuçlar, OECD sağlık sistemlerinin yaşlanmaya öncelikle sağlık iş gücü uyumu yoluyla yanıt verdiğini ve stratejik sağlık iş gücü planlamasının önemini ortaya koymaktadır.
Anahtar Sözcükler: Nüfus yaşlanması, sağlık iş gücü, sağlık sistemi hazırlığı, OECD ülkeleri, hekim yoğunluğu
JEL Kodu: C23, I18, J11

[1] Nişantaşı University, Istanbul, Türkiye. E-mail: mesudemede83@gmail.com ORCID: 0009-0000-8006-5215
[2] Health Management PhD Program, Altınbaş University, Istanbul, Türkiye. E-mail: dtaysegulerkoc@gmail.com ORCID: 0000-0002-6765-715X
[3] Health Management PhD Program, Altınbaş University, Istanbul, Türkiye. E-mail: zelihak24@gmail.com ORCID: 0009-0004-4979-5681

Introduction

Population ageing has emerged as one of the most significant demographic transformations of the twenty-first century. Across OECD countries, declining fertility rates and increasing life expectancy have fundamentally altered population structures, resulting in a steadily growing proportion of older adults. According to OECD statistics, the share of individuals aged 65 years and over has increased substantially over recent decades and is projected to continue rising in the coming years (OECD, 2023). This demographic transition has generated growing concerns regarding the long-term sustainability and preparedness of healthcare systems. The consequences of population ageing extend far beyond an increase in the number of older individuals. Ageing populations are associated with a higher prevalence of chronic diseases, multimorbidity, disability, and long-term care needs, all of which contribute to greater demand for healthcare services (Beard et al., 2016; World Health Organization, 2022). In addition, recent evidence suggests that older adults continue to face important barriers in accessing health, social and long-term care services, highlighting the need for better coordinated and age-responsive healthcare systems (Cabañero-Garcia et al., 2025). As a result, healthcare systems face the challenge of adapting not only financially but also structurally. This adaptation requires adjustments in healthcare workforce capacity, service delivery models, infrastructure, and resource allocation mechanisms.

Traditionally, the literature has focused primarily on the relationship between population ageing and healthcare expenditure. Early studies argued that ageing was a major driver of increasing healthcare costs (Zweifel et al., 1999; Getzen, 2000). However, subsequent research demonstrated that the relationship is more complex than initially assumed. Factors such as technological progress, institutional arrangements, healthcare policies and proximity to death may influence healthcare spending as much as demographic ageing itself (de Meijer et al., 2013; Colombier, 2017). Consequently, researchers have increasingly shifted their attention from expenditure alone to broader indicators of healthcare system preparedness and responsiveness.

Recent studies have emphasized the importance of healthcare workforce capacity in ageing societies. Physician availability has been identified as a critical determinant of healthcare access, service quality and system resilience (Scheffler & Arnold, 2019; OECD, 2023). As the healthcare needs of older populations become more complex, ensuring an adequate supply of healthcare professionals becomes essential for maintaining effective service delivery. At the same time, policymakers have frequently assumed that demographic ageing would necessitate substantial expansions in hospital infrastructure and healthcare utilization. Nevertheless, empirical findings remain mixed regarding whether increases in the elderly population consistently translate into higher levels of hospital capacity or service use (Rechel et al., 2013; de Meijer et al., 2015). Although ageing is frequently associated with increasing healthcare demand, healthcare systems may respond through different adaptation pathways, including workforce expansion, organizational reforms, efficiency improvements and service reconfiguration. Recent policy discussions increasingly emphasize healthy ageing, prevention, community-based care and long-term care integration as key strategies for strengthening health system preparedness and sustainability in ageing societies (World Health Organization, 2021; OECD, 2025). Understanding which dimensions of healthcare systems respond most strongly to demographic ageing remains an important policy question.

Conceptual Framework

Although a growing body of literature examines specific dimensions of ageing and healthcare systems, most studies focus on a single outcome such as expenditure, workforce, infrastructure, or service utilization. Previous studies have often examined workforce capacity, healthcare expenditure, or service utilization separately (Scheffler & Arnold, 2019; de Meijer et al., 2015). Comparatively fewer studies have integrated workforce, infrastructure and utilization indicators within a single empirical framework. As a result, the broader question of how healthcare systems prepare for and respond to demographic ageing remains insufficiently explored, particularly from a cross-country comparative perspective.

This study seeks to address this gap by examining the relationship between population ageing and three key dimensions of healthcare system preparedness: physician density, hospital bed capacity and healthcare utilization measured through doctor consultations. Using a panel dataset covering 26 OECD countries between 2015 and 2023, the study evaluates whether demographic ageing is associated with changes in healthcare workforce capacity, healthcare infrastructure and service utilization patterns. Unlike previous studies that focus primarily on healthcare expenditure, the present research emphasizes the structural and operational responses of healthcare systems to demographic change. The period examined in this study is particularly relevant because it captures a phase during which population ageing accelerated across many OECD countries while comparable data remained available across multiple healthcare system indicators. Furthermore, the inclusion of post-pandemic years allows for a broader assessment of demographic trends and system responses than studies restricted to the pre-pandemic period. By integrating workforce, infrastructure and utilization indicators within a single analytical framework, this study contributes to the growing literature on healthcare system preparedness in ageing societies. The findings provide evidence on whether healthcare systems respond uniformly to demographic pressure or whether adaptation occurs selectively across different dimensions of healthcare provision. These insights are particularly relevant for policymakers seeking to design sustainable healthcare systems capable of meeting the needs of rapidly ageing populations..

Methodology

Research Design

This study employs a quantitative research design based on secondary data analysis to investigate how healthcare systems respond to population ageing across OECD countries. The study focuses on three key dimensions of healthcare system preparedness: healthcare workforce capacity, hospital infrastructure and healthcare utilization. By examining these dimensions simultaneously, the research aims to provide a comprehensive assessment of healthcare system responses to demographic change. To achieve this objective, a panel data approach was adopted. Panel data analysis offers important advantages by allowing the examination of both cross-country differences and changes within countries over time. This approach is particularly suitable for analysing demographic and healthcare-related developments that evolve gradually across countries and years. The empirical analysis was conducted using panel data from 26 OECD countries covering the period 2015–2023. The analytical framework consists of several stages. First, descriptive statistics were used to summarize the characteristics of the variables. Second, Pearson correlation analysis was performed to examine bivariate relationships among the variables. Third, pooled ordinary least squares (OLS) regression models were estimated to provide an initial assessment of the relationship between population ageing and healthcare system indicators.

To account for unobserved country-specific characteristics, both fixed-effects (FE) and random-effects (RE) panel regression models were estimated. The Hausman specification test was subsequently applied to determine the most appropriate model. The results indicated that the fixed-effects model was preferable to the random-effects model. Furthermore, diagnostic tests revealed the presence of heteroskedasticity. Therefore, fixed-effects models with cluster-robust standard errors were employed in the final stage of the analysis to obtain more reliable coefficient estimates. This methodological framework allows for a comprehensive evaluation of whether population ageing is associated with changes in physician density, hospital bed capacity and healthcare utilization across OECD countries while controlling for country-specific characteristics and potential estimation biases.

Data Sources

The dataset was constructed using internationally comparable secondary data obtained from the OECD and World Bank databases (OECD, 2024; World Bank, 2024). These databases were selected because they provide standardized and widely used indicators for cross-country

analyses of demographic structure, economic conditions and healthcare system performance. Demographic and economic indicators, including the share of the population aged 65 and over, GDP per capita and life expectancy, were obtained from the World Bank database. Healthcare system indicators, including physician density, hospital bed capacity and doctor consultations, were obtained from OECD Health Statistics. The use of these two data sources allows the study to combine demographic, economic and healthcare system indicators within a single comparative framework. This structure makes it possible to assess how healthcare systems in OECD countries prepare for and respond to population ageing across workforce, infrastructure and utilization dimensions.

Variables

The study includes one main demographic variable, three healthcare system preparedness indicators and two control variables. The main demographic variable is population ageing, measured as the percentage of the population aged 65 years and over. This variable represents the demographic pressure placed on healthcare systems. Healthcare system preparedness is examined through three indicators. Physician density, measured as physicians per 1,000 population, is used to represent healthcare workforce capacity. Hospital beds per 1,000 population are used as an indicator of infrastructure capacity. Doctor consultations per capita are included to capture healthcare utilization.

In addition, GDP per capita and life expectancy are included as control variables. GDP per capita reflects the level of economic development, while life expectancy represents the broader population health context. These variables were selected to capture different dimensions of healthcare system preparedness in ageing societies, including workforce capacity, infrastructure, utilization, economic context and population health. Physician density was selected because healthcare workforce availability is widely recognized as a core component of health system preparedness. Hospital bed capacity represents healthcare infrastructure and service availability, whereas doctor consultations reflect healthcare utilization patterns. Together, these indicators provide a multidimensional perspective on how healthcare systems adapt to demographic ageing.

Time Period and Sample Selection

The analysis covers the period 2015–2023 and includes 26 OECD countries. This time frame was selected because it represents the longest period for which comparable information on population ageing, healthcare workforce capacity, hospital infrastructure, healthcare utilization and control variables was simultaneously available across the majority of OECD countries. Initially, all OECD member countries were considered for inclusion. However, several countries were excluded due to substantial missing observations in one or more key variables, particularly physician density, hospital bed capacity and doctor consultations. To ensure data quality and comparability, only countries with sufficient and relatively consistent data coverage throughout the study period were retained in the final sample. The final dataset covers 26 OECD countries over the period 2015–2023. Its panel structure improves the reliability of the estimations and facilitates comparisons across countries and over time.

The selected period is also particularly relevant because it captures recent demographic developments in OECD countries while providing a sufficiently long time horizon to observe changes in healthcare system preparedness indicators. Thus, the study balances data availability, cross-country comparability and analytical reliability. The final sample consists of 26 OECD countries with sufficient data availability for the selected indicators.

Analytical Strategy

The empirical analysis was conducted in several stages. First, descriptive statistics were calculated to summarize the distribution and characteristics of all variables included in the study. Means, standard deviations, minimum values and maximum values were reported to provide an overview of the dataset. Second, Pearson correlation analysis was performed to examine the direction and strength of bivariate relationships among the variables. This step provided an initial assessment of associations between population ageing and healthcare system preparedness

indicators. Third, pooled ordinary least squares (OLS) regression models were estimated to explore the relationship between population ageing and the selected healthcare system indicators. Fourth, panel data estimation techniques were employed. Both fixed-effects (FE) and random-effects (RE) models were estimated in order to account for unobserved country-specific characteristics. The Hausman specification test was subsequently used to determine the most appropriate model. The test results indicated that the fixed-effects model was preferable to the random-effects specification.

To assess the validity of the regression models, several diagnostic tests were conducted. Multicollinearity was examined using the Variance Inflation Factor (VIF), while heteroskedasticity was assessed using the Modified Wald test. Since heteroskedasticity was detected, the final models were estimated using cluster-robust standard errors at the country level to obtain reliable coefficient estimates. All statistical analyses were conducted using Stata 17 MP. The panel data methods employed in this study are widely used in cross-country empirical research and are consistent with established econometric approaches for longitudinal data analysis (Baltagi, 2021; Wooldridge, 2010).

Methodological Considerations

Several methodological considerations should be acknowledged. First, the study relies on secondary data obtained from international databases, making the analysis dependent on the availability and consistency of reported country-level statistics. Although OECD and World Bank databases are widely recognized for their reliability, minor reporting differences across countries may remain. Second, the study focuses on selected indicators of healthcare system preparedness and therefore does not capture all possible dimensions of healthcare system adaptation. Variables such as long-term care services, healthcare quality indicators and health policy interventions were not included due to data availability constraints. Finally, the findings should be interpreted as evidence of statistical associations rather than definitive causal relationships. While panel data techniques help control for unobserved country-specific characteristics, the study does not aim to establish causality but rather to identify patterns of healthcare system response to demographic ageing across OECD countries. Doctor consultation data were available for fewer observations than other indicators, which may have reduced statistical power and affected the precision of the estimates.

Ethical Considerations:

Ethical approval was not required for this study because the research was based exclusively on publicly available secondary data sources and did not involve human participants, personal data, biological materials, or any intervention.

Results

Descriptive Statistics

Table 1 presents descriptive statistics for the variables included in the analysis. The dataset consists of 26 OECD countries observed annually between 2015 and 2023.

Table 1. Descriptive Statistics of Variables (2015–2023)

Variable	Obs	Mean	Std. Dev.	Min	Max
Age65	234	19.05	3.13	11.02	29.56
GDPpc	234	43,446.01	24,520.41	12,464.01	134,965.80
LifeExp	234	80.75	2.73	72.98	84.56
Physicians	201	3.75	0.78	2.24	5.85
HospitalBeds	226	5.32	2.69	1.87	13.17
DoctorConsultations	179	7.73	2.73	2.00	18.00

Note: Descriptive statistics are based on available observations for each variable. Author's calculations based on OECD and World Bank data.

The descriptive statistics indicate considerable variation across OECD countries in terms of demographic structure and healthcare system characteristics. On average, individuals aged 65 years and over account for approximately 19% of the population, highlighting the advanced stage of population ageing across the sample. Substantial differences are also observed in physician density, hospital bed availability and healthcare utilization levels.

Correlation Analysis

Table 2 presents the Pearson correlation coefficients among the study variables.

Table 2. Correlation Matrix

Variables	Age65	GDPpc	LifeExp	Physicians	HospitalBeds	DoctorConsultations
Age65	1.000					
GDPpc	-0.224***	1.000				
LifeExp	0.011	0.596***	1.000			
Physicians	0.241***	0.218***	0.076	1.000		
HospitalBeds	0.280***	-0.261***	-0.055	-0.276***	1.000	
DoctorConsultations	0.063	-0.302***	-0.105	-0.120	0.696***	1.000

Note: Pearson correlation coefficients are reported. *** p < 0.01, ** p < 0.05, * p < 0.10.

The correlation analysis reveals several noteworthy patterns. Population ageing is positively associated with physician density ($r = 0.241$, $p < 0.01$) and hospital bed capacity ($r = 0.280$, $p < 0.01$). However, no statistically significant relationship is observed between population ageing and doctor consultations ($r = 0.063$, $p > 0.05$). These findings suggest that healthcare system capacity indicators may respond differently to demographic ageing than healthcare utilization indicators.

Panel Regression Results

To examine the relationship between population ageing and healthcare system preparedness indicators while controlling for country-specific characteristics, fixed-effects and random-effects panel regression models were estimated. The Hausman specification test indicated that the fixed-effects model was more appropriate than the random-effects model ($\chi^2 = 6.40$, $p = 0.041$). Diagnostic tests revealed the presence of heteroskedasticity (Modified Wald test, $p < 0.001$). Therefore, the final results are reported using fixed-effects models with cluster-robust standard errors.

Table 3. Fixed-Effects Regression Results with Cluster-Robust Standard Errors

Variables	Physicians	Hospital Beds	Doctor Consultations
Age65	0.172***	-0.060	0.054
	(0.052)	(0.075)	(0.093)
GDPpc	0.000006	-0.000020**	0.000009
	(0.000004)	(0.000010)	(0.000018)
LifeExp	0.023	-0.008	0.114*
	(0.023)	(0.040)	(0.065)
Observations	201	226	179
Countries	26	26	26
Within R^2	0.594	0.325	0.060

*Notes: Robust standard errors clustered at the country level. *** p < 0.01, ** p < 0.05, * p < 0.10.*

The results indicate that population ageing is positively and significantly associated with physician density. Specifically, a one-percentage-point increase in the share of the population aged 65 and over is associated with an increase of approximately 0.17 physicians per 1,000 population. This finding suggests that OECD healthcare systems respond to demographic ageing primarily by expanding healthcare workforce capacity. In contrast, population ageing does not exhibit a statistically significant relationship with hospital bed capacity or doctor consultation rates. These findings indicate that increases in the elderly population do not automatically translate into greater infrastructure expansion or higher healthcare utilization. Overall, the results suggest that healthcare systems adapt selectively to demographic ageing. Workforce capacity appears to be the primary area of adjustment, whereas infrastructure and utilization indicators remain relatively stable after controlling for country-specific characteristics and economic conditions.

Diagnostic Tests

To assess model validity, several diagnostic tests were conducted.

Table 4. Diagnostic Test Results

Test	**Result**
Hausman Test	χ^2=6.40, p=0.0407
Mean VIF	1.52
Modified Wald Test	p<0.001
Robust SE Applied	Yes
Preferred Model	Fixed Effects

The Hausman test supported the use of fixed-effects models, indicating the presence of country-specific effects correlated with the explanatory variables. Multicollinearity was not a concern, as all VIF values were well below commonly accepted thresholds. The Modified Wald test revealed heteroskedasticity, which was addressed through the use of cluster-robust standard errors.

Discussion and Conclusion

The findings of this study provide important insights into how healthcare systems prepare for and respond to demographic ageing across OECD countries. The results reveal that population ageing is significantly associated with physician density, whereas no statistically significant relationship is observed with hospital bed capacity or doctor consultation rates after controlling for country-specific effects and economic conditions. These findings suggest that healthcare systems do not adapt uniformly to demographic change; rather, they appear to prioritize specific dimensions of preparedness. The most notable finding is the positive and statistically significant relationship between population ageing and physician density. The fixed-effects estimates indicate that countries experiencing increases in the proportion of older adults tend to expand healthcare workforce capacity over time. This finding is consistent with previous studies emphasizing the critical role of healthcare professionals in maintaining service accessibility and system resilience in ageing societies (Scheffler & Arnold, 2019; OECD, 2023). As older populations typically require more complex and continuous care, healthcare workforce expansion may represent the most direct and flexible policy response to demographic pressure.

In contrast, population ageing does not appear to be associated with significant changes in hospital bed capacity. Although descriptive and bivariate analyses initially suggested a positive relationship, this association disappears once country-specific characteristics are controlled for in the fixed-effects framework. This finding challenges the traditional assumption that ageing societies necessarily require continuous expansion of hospital infrastructure. Instead, it may reflect ongoing transformations in healthcare delivery systems, including the shift toward outpatient

services, community-based care, integrated care models and improvements in healthcare efficiency (Rechel et al., 2013; OECD, 2023). Equally important is the absence of a significant relationship between population ageing and doctor consultation rates. Conventional expectations often assume that older populations inevitably generate greater healthcare utilization because of higher rates of chronic disease and multimorbidity (Dormont et al., 2006). However, the results suggest that healthcare utilization is shaped by a broader set of factors beyond demographic structure alone. Institutional arrangements, healthcare organization, technological developments, preventive care strategies and service delivery models may moderate the extent to which ageing translates into increased service use (de Meijer et al., 2015). Taken together, these findings point toward a process of selective adaptation rather than uniform expansion. Healthcare systems appear to respond to demographic ageing primarily by strengthening workforce capacity, while infrastructure and utilization indicators remain comparatively stable. This pattern suggests that policymakers may increasingly view healthcare professionals as the most strategic resource for addressing the challenges associated with population ageing.

The results also contribute to the broader debate regarding the consequences of population ageing for healthcare systems. Much of the existing literature has focused on healthcare expenditure and fiscal sustainability (de Meijer et al., 2013; Colombier, 2017). While these issues remain important, the present findings indicate that adaptation should also be understood as an organizational and structural process. The capacity of healthcare systems to adjust their workforce composition may be as important as financial considerations in responding to demographic change. Another important contribution of this study is methodological. By examining healthcare workforce capacity, hospital infrastructure and healthcare utilization simultaneously within a single analytical framework, the study provides a more comprehensive perspective on healthcare system preparedness than studies focusing on a single indicator. The findings demonstrate that different components of healthcare systems may respond differently to the same demographic pressures.

Nevertheless, several limitations should be acknowledged. The analysis is restricted to variables for which comparable cross-country data were available, and therefore does not capture all dimensions of healthcare system adaptation. In particular, long-term care services, healthcare quality indicators and policy-specific interventions were not included in the empirical framework. Future research may benefit from incorporating these dimensions to provide a more detailed understanding of adaptation processes in ageing societies. Overall, the findings suggest that healthcare systems do not simply expand in response to population ageing. Instead, they adapt selectively, with workforce development emerging as the most visible and consistent response. This highlights the importance of strategic workforce planning as a central component of healthcare system preparedness in ageing societies.

This study examined how healthcare systems in OECD countries respond to population ageing by focusing on healthcare workforce capacity, hospital infrastructure and healthcare utilization. Using panel data from 26 OECD countries covering the period 2015–2023, the analysis provides evidence on how healthcare systems adapt to demographic change beyond traditional expenditure-based approaches. The findings demonstrate that healthcare systems do not respond uniformly to population ageing. While population ageing is positively and significantly associated with physician density, no statistically significant relationship is observed with hospital bed capacity or doctor consultation rates after controlling for country-specific characteristics and economic conditions. These results indicate that demographic ageing does not automatically lead to broad expansion across all dimensions of healthcare systems. Instead, adaptation appears to occur selectively, with healthcare workforce development emerging as the most consistent response.

From a policy perspective, the results highlight the importance of workforce planning as a central component of healthcare system preparedness. As ageing populations generate increasingly complex healthcare needs, ensuring an adequate supply of healthcare professionals becomes

essential for maintaining accessibility, continuity of care and system resilience. Investments in workforce capacity may therefore be more effective than relying solely on infrastructure expansion. The absence of a significant relationship between ageing and hospital bed capacity also suggests that policymakers should reconsider traditional infrastructure-oriented approaches. Rather than continuously expanding inpatient capacity, healthcare systems may benefit from strengthening primary care, community-based services, integrated care models and preventive healthcare strategies that are better aligned with the needs of ageing populations. More broadly, the findings suggest that population ageing should not be viewed simply as a driver of healthcare expansion. Instead, it should be understood as a catalyst for healthcare system transformation. The challenge facing policymakers is not merely to increase resources, but to allocate and organize those resources in ways that improve efficiency, responsiveness, and long-term sustainability.

This study contributes to the literature by examining multiple dimensions of healthcare system preparedness within a single analytical framework. By simultaneously considering workforce capacity, infrastructure and healthcare utilization, it provides a more comprehensive understanding of how healthcare systems respond to demographic change across OECD countries. Nevertheless, several limitations should be acknowledged. The analysis is restricted to indicators for which comparable international data were available and therefore does not capture all dimensions of healthcare system adaptation. In particular, long-term care services, healthcare quality indicators, digital health capacity and policy-specific interventions were not included in the empirical framework. Future research could incorporate these dimensions and explore country-specific adaptation strategies in greater detail.

In conclusion, the findings indicate that healthcare systems respond to demographic ageing selectively rather than uniformly. Understanding these differentiated patterns of adaptation is essential for developing sustainable and resilient healthcare systems capable of meeting the needs of ageing populations. “Healthcare systems do not simply expand in response to ageing; they transform. Recognizing and managing this transformation is essential for ensuring sustainable, resilient and equitable healthcare systems in the future.”

References

Baltagi, B. H. (2021). *Econometric analysis of panel data* (6th ed.). Springer. https://doi.org/10.1007/978-3-030-53953-5

Beard, J. R., Officer, A., de Carvalho, I. A., Sadana, R., Pot, A. M., Michel, J. P., Lloyd-Sherlock, P., Epping-Jordan, J. E., Peeters, G. M., Mahanani, W. R., Thiyagarajan, J. A., & Chatterji, S. (2016). The world report on ageing and health: A policy framework for healthy ageing. *The Lancet, 387*(10033), 2145–2154. https://doi.org/10.1016/S0140-6736(15)00516-4

Cabañero-García, E., Martínez-Lacoba, R., Pardo-García, I., & Amo-Saus, E. (2025). Barriers to health, social and long-term care access among older adults: A systematic review of reviews. *International Journal for Equity in Health, 24*(1), 72. https://doi.org/10.1186/s12939-025-02429-y

Colombier, C. (2017). Population ageing and healthcare expenditure: New evidence on the “red herring”. *Applied Economics, 49*(1), 1–16. https://doi.org/10.1080/00036846.2016.1186797

de Meijer, C., Koopmanschap, M., Koolman, X., & van Doorslaer, E. (2013). The role of demographic and technological change in explaining health care expenditure growth. *Journal of Health Economics, 32*(3), 607–620. https://doi.org/10.1016/j.jhealeco.2013.02.015

de Meijer, C., Wouterse, B., Polder, J., & Koopmanschap, M. (2015). The effect of population ageing on health expenditure growth: A critical review. *European Journal of Ageing, 10*(4), 353–361. https://doi.org/10.1007/s10433-013-0280-x

Dormont, B., Grignon, M., & Huber, H. (2006). Health expenditure growth: Reassessing the threat of ageing. *Health Economics, 15*(9), 947–963. https://doi.org/10.1002/hec.1165

Getzen, T. E. (2000). Health care is an individual necessity and a national luxury: Applying multilevel decision models to the analysis of health care expenditures. *Journal of Health Economics, 19*(2), 259–270. https://doi.org/10.1016/S0167-6296(99)00032-6

Organisation for Economic Co-operation and Development (OECD). (2023). *Health at a glance 2023: OECD indicators*. OECD Publishing. https://doi.org/10.1787/7a7afb35-en

Organisation for Economic Co-operation and Development (OECD). (2024). *OECD Health Statistics*. https://data.oecd.org

Organisation for Economic Co-operation and Development (OECD). (2025). *The economic benefit of promoting healthy ageing and community care*. OECD Publishing.

Prince, M. J., Wu, F., Guo, Y., Gutierrez Robledo, L. M., O'Donnell, M., Sullivan, R., & Yusuf, S. (2015). The burden of disease in older people and implications for health policy and practice. *The Lancet, 385*(9967), 549–562. https://doi.org/10.1016/S0140-6736(14)61347-7

Rechel, B., Doyle, Y., Grundy, E., & McKee, M. (2013). *How can health systems respond to population ageing?* World Health Organization Regional Office for Europe.

Scheffler, R. M., & Arnold, D. R. (2019). Projecting shortages and surpluses of physicians in the OECD: What looms ahead. *Health Economics, Policy and Law, 14*(2), 274–290. https://doi.org/10.1017/S174413311700055X

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data* (2nd ed.). MIT Press.

World Bank. (2024). *World Development Indicators*. https://data.worldbank.org

World Health Organization. (2021). *UN decade of healthy ageing 2021–2030*. World Health Organization. https://www.who.int/initiatives/decade-of-healthy-ageing

World Health Organization. (2022). *Ageing and health*. World Health Organization. https://www.who.int/news-room/fact-sheets/detail/ageing-and-health

Zweifel, P., Felder, S., & Meiers, M. (1999). Ageing of population and health care expenditure: A red herring? *Health Economics, 8*(6), 485–496. https://doi.org/10.1002/(SICI)1099-1050(199909)8:6<485::AID-HEC461>3.0.CO;2-4

Author Contribution Statement: The authors contributed equally to the study. All authors participated in the design of the research, interpretation of the findings, manuscript preparation, and approval of the final version of the manuscript.

Conflict of Interest Statement: The authors declare that there is no potential conflict of interest regarding the research, authorship, or publication of this article.

Funding Statement: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

GENİŞLETİLMİŞ ÖZET

Nüfus yaşlanması, OECD ülkeleri başta olmak üzere birçok ülkede sağlık sistemlerini etkileyen en önemli demografik dönüşümlerden biri haline gelmiştir. Doğurganlık oranlarının azalması ve yaşam beklentisinin artması sonucunda yaşlı nüfusun toplam nüfus içindeki payı giderek yükselmektedir. Bu durum sağlık sistemleri üzerinde hem mali hem de yapısal baskılar oluşturmaktadır. Literatürde yaşlanmanın sağlık harcamaları üzerindeki etkileri yaygın olarak incelenmiş olmakla birlikte, sağlık sistemlerinin demografik yaşlanmaya nasıl uyum sağladığına ilişkin çalışmalar daha sınırlıdır. Mevcut araştırmalar çoğunlukla sağlık harcamaları, sağlık iş gücü, altyapı kapasitesi veya sağlık hizmet kullanımı gibi göstergeleri ayrı ayrı ele almaktadır. Buna karşılık sağlık sistemlerinin yaşlanmaya yönelik hazırlığını iş gücü kapasitesi, altyapı kapasitesi ve sağlık hizmet kullanımı boyutlarını birlikte değerlendirerek inceleyen çalışmaların sayısı oldukça sınırlıdır. Bu nedenle sağlık sistemlerinin demografik yaşlanmaya hangi alanlarda ve hangi ölçüde uyum sağladığının belirlenmesi önemli bir araştırma konusu olarak öne çıkmaktadır.

Yöntem: Bu çalışmanın amacı, OECD ülkelerinde sağlık sistemlerinin demografik yaşlanmaya nasıl yanıt verdiğini incelemektir. Araştırmada 2015–2023 dönemini kapsayan 26 OECD ülkesine ait panel veri seti kullanılmıştır. Veriler OECD Sağlık İstatistikleri ve Dünya Bankası veri tabanlarından elde edilmiştir. Nüfus yaşlanması, 65 yaş ve üzeri nüfusun toplam nüfus içindeki payı ile ölçülmüştür. Sağlık sistemi hazırlığını değerlendirmek amacıyla hekim yoğunluğu, hastane yatak kapasitesi ve kişi başına doktor başvuru sayısı göstergeleri kullanılmıştır. Ayrıca kişi başına gayrisafi yurt içi hasıla ile yaşam beklentisi kontrol değişkenleri olarak modele dahil edilmiştir. Analiz sürecinde tanımlayıcı istatistikler, Pearson korelasyon analizi, havuzlanmış OLS modelleri, sabit etkiler ve rassal etkiler modelleri kullanılmıştır. Hausman testi sonuçları sabit etkiler modelinin tercih edilmesi gerektiğini göstermiştir. Heteroskedastisite sorununu dikkate almak amacıyla küme-robust standart hatalar kullanılmıştır.

Bulgular ve Tartışma: Araştırma bulguları, nüfus yaşlanması ile hekim yoğunluğu arasında pozitif ve istatistiksel olarak anlamlı bir ilişki olduğunu göstermektedir. Sabit etkiler modeline göre yaşlı nüfus oranındaki artış, hekim yoğunluğundaki artışla ilişkilidir. Bu sonuç, sağlık sistemlerinin demografik baskıya öncelikli olarak sağlık iş gücünü artırarak yanıt verdiğini göstermektedir. Buna karşılık nüfus yaşlanması ile hastane yatak kapasitesi arasında istatistiksel olarak anlamlı bir ilişki bulunmamıştır. Benzer şekilde doktor başvuru sayıları ile yaşlanma arasında da anlamlı bir ilişki tespit edilmemiştir. Bulgular, yaşlanmanın sağlık sistemlerinde tüm göstergelerde eş zamanlı bir genişlemeye yol açmadığını göstermektedir. Bunun yerine sağlık sistemleri belirli alanlarda seçici uyum mekanizmaları geliştirmektedir. Özellikle sağlık iş gücü kapasitesindeki artışın, altyapı kapasitesine kıyasla daha belirgin olduğu görülmektedir. Bu durum sağlık hizmet sunumunda hastane temelli modellerden daha esnek ve toplum temelli yaklaşımlara geçişin bir göstergesi olarak değerlendirilebilir.

Sonuç ve Öneriler: Çalışma sonuçları OECD ülkelerinde sağlık sistemlerinin nüfus yaşlanmasına esas olarak sağlık iş gücü uyumu yoluyla yanıt verdiğini ortaya koymaktadır. Buna karşılık altyapı kapasitesi ve sağlık hizmet kullanımında benzer düzeyde bir genişleme gözlenmemektedir. Bu bulgular, sağlık sistemlerinin yaşlanmaya karşı tek tip değil, seçici ve farklılaşmış uyum stratejileri geliştirdiğini göstermektedir. Politika yapıcılar açısından değerlendirildiğinde, yaşlanan toplumların ihtiyaçlarına cevap verebilmek için sağlık iş gücü planlamasının güçlendirilmesi büyük önem taşımaktadır. Ayrıca sağlık hizmetlerinin sürdürülebilirliğini artırmak amacıyla kaynakların etkin kullanımı, entegre bakım modelleri ve toplum temelli hizmetlerin geliştirilmesi gerekmektedir. Çalışma, sağlık sistemi hazırlığını iş gücü, altyapı ve hizmet kullanımı boyutlarını birlikte ele alarak değerlendirmesi bakımından literatüre katkı sunmaktadır.