



Gender diversity and healthcare performance: A quantitative analysis from the Italian health system

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ABSTRACT

Unlike many other industries, which are characterized by a more significant presence of men than women, the healthcare sector has a clear majority of women. However, even if at the non-executive level, the percentage of women is extremely higher than that of men, at the executive level, this percentage is completely overturned, generating the so-called glass ceiling effect. Despite extensive research on gender diversity and its impact on financial metrics, few studies have focused on clinical measures. To bridge this research gap, the article analyzes the relationship between gender diversity and healthcare metrics. We developed an econometric model for unbalanced panel data by performing a random effect and a quantile regression analysis, which test the relationship between gender diversity and the average length of stay (LOS), controlling for structural and clinical metrics. We find that, in general, a higher percentage of women in non-executive positions is related to an increase in LOS. Conversely, a higher rate of women in executive positions is related to a lower level of LOS. Empirical evidence supports the relevance of including human resources strategies to increase the number of women at executive managerial positions. However, the study highlights also the necessity to consider how to make the public health sector positions more appealing for men.

1. Introduction

The healthcare sector is characterized by a substantial gender disparity, with a majority of women employees in non-executive positions but a significant underrepresentation of women in executive positions. In this line, the European Institute for Gender Equality (EIGE), the European Commission, and the United Nations took measures to address this imbalance and reduce the gender diversity gap by implementing the Horizon Europe Guidance on Gender Equality Plans and the Sustainable Development Goal 5 (SDG 5) [1,2]. Furthermore, several studies endorsed the adopted policies, showing that a diverse workforce featuring a balanced representation of both genders fosters better organizational outcomes [3,4]. Hence, the relevance of gender diversity in organizational performance has attracted significant scholarly attention in various fields, yielding mixed results [5–7]. On the one hand, gender diversity in leadership positions has been correlated with heightened performance, engendering a broader spectrum of perspectives, experiences, and problem-solving approaches, fueling creativity and innovation [8,9]. On the other hand, gender diversity may cause difficulties in reaching a consensus due to different viewpoints and

communication styles, potentially leading to lengthier decision-making processes [10]. However, despite extensive research on gender diversity and its impact on value creation across various sectors, few studies have focused on the healthcare sector [11,12]. Specifically, diversity of thought can be particularly valuable in a complex industry such as healthcare, where adaptability and innovation are essential for providing high-quality patient care [13]. Thus, this conflicting evidence prompts an investigation into whether increasing gender diversity may impact healthcare performance in the healthcare sector. In this respect, a widely acknowledged management performance indicator of healthcare organizations, with implications for both financial and non-financial aspects, is the average length of stay (LOS). An exhaustive investigation was undertaken to determine the elements exerting a dynamic impact on LOS, underscoring the importance of its reduction [14–16]. Studies related to LOS delve into socioeconomic and organizational components [17,18], patient characteristics [19], and the interplay between medical, social, psychological, and institutional components [20]. These studies underline the crucial determinants of LOS, focusing on fine-tuning healthcare efficiency and optimizing quality of care [21]. Nonetheless, to this date, scant attention has been

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devoted to the composition of healthcare sector workers as a factor affecting LOS. Specifically, gender diversity not only impacts decision-making processes but also exerts a significant influence on workplace culture and organizational performance. By addressing the potential impact of gender diversity on LOS and considering other relevant factors that may influence LOS trends, healthcare leaders and policymakers can make well-informed decisions to foster diversity, creating an inclusive culture that amplifies organizational performance and, ultimately, elevating patient outcomes [22]. Hence, to bridge this research gap, this paper investigates the relationship between gender diversity and LOS in Italian healthcare organizations from 2016 to 2021. By exploring the impact of gender diversity on LOS while controlling for structural and clinical metrics, we seek to provide empirical evidence and policy implications regarding the relationship between gender diversity and non-financial performance in the healthcare sector.

2. Theoretical framework

The existing literature encompasses different theories on the benefits of gender diversity. The resource dependency theory suggests that diversity is the ability to attract members who complement both human and social capital, raising interconnections that span the organization, the employees, and the environment [23,24]. Similarly, the signaling theory propounds diversity as an organizational signal that intends to embrace diverse viewpoints and opinions, mitigating information asymmetry among stakeholders [25] and allowing organizations to improve their reputation [26]. Agency theory emphasizes the role of heterogeneity in reinforcing monitoring functions [27,28] and mitigating agency costs, particularly in less competitive markets [29]. In this regard, the majority of recent research on the public sector has revealed a positive association between gender diversity and performance [30–33]. Opstrup and Villadsen, working on a longitudinal analysis of top management teams in Danish municipalities, found a positive relationship between gender diversity and financial performance. Using a sample of Spanish municipalities, Cuadrado-Ballesteros et al. revealed that, with sufficient representation, women could contribute positively to the financial stability of local governments. An and Lee suggested that variety and disparity positively impact the performance of Korean local government-owned enterprises. Upon examining federal tax employees, Wegge et al. identified gender diversity as a determinant of performance in public organizations.

Conversely, the social identity theory centers upon the interplay between individual identity and social structures, prompting people to categorize themselves as interacting with counterparts belonging to the same identity group [34,35]. In line with this, several authors argue that an individual's membership in a social group and the consequent mutual engagement of activities and stereotypical cognitions prompt people to compare themselves, engendering social discrimination towards groups, amplifying the marginalization of those who are different in terms of gender, race, and ethnicity, splitting workers into subgroups, hampering decisions, and ultimately reducing the organization's performance [36–41].

Upon reviewing the gender diversity within the healthcare domain, it can be seen that the healthcare landscape is characterized by a substantial gender asymmetry, with a preponderance of women occupying subordinate positions juxtaposed with a low number of women in the uppermost tiers of the hierarchy. Lantz argued that, despite widespread recognition of this issue, there is a notable absence of meaningful actions and policy recommendations [42].

Furthermore, research investigating how gender relates to performance in healthcare organizations is scarce [42–46]. Burns and Muller called attention to the indispensability of interprofessional collaborations among healthcare employees, marking the importance of a distinct decision-making perspective in reducing information asymmetry, increasing monitoring functions, and improving healthcare management performance. Silvera and Clark suggested that women chief

executive officers enhance the interpersonal care experience more rapidly than their male counterparts, especially in highly complex executive job settings, such as densely populated urban environments and large hospital facilities. Arena et al. indicated that women managers, particularly those with a legal background, promote the adoption of innovative strategies and facilitate the implementation of e-health initiatives. Ellwood and Garcia-Lacalle found that a greater representation of women is associated with a notable decrease in adverse social outcomes.

The present study aims to explore the connection between gender diversity and the performance of Italian healthcare organizations. In particular, it focuses on executive roles in which women are under-represented and non-executive roles in which women are over-represented, aiming to determine whether achieving a more heterogeneous composition would be beneficial. In relation to this, Naciti et al. highlighted a negative relationship between the proportion of women in overrepresented subcategories and both return on sales and the liquidity index [47].

Based on these premises, this study investigates the following research question:

RQ: Investigate the relationship between gender diversity and healthcare organizations' performance, measuring executive and non-executive roles to determine whether there are different relationship patterns at different levels of working positions.

3. Material and methods

3.1. Sample and data collection

The study sample comprised data from Italian healthcare organizations between 2016 and 2021 and was solicited from the Italian Regional Performance Evaluation System (IRPES). IRPES encompasses about 190 health organizations providing health services to about 20 million patients. However, since IRPES is based on a voluntary initiative adopted by regional health systems to actively contribute to the ongoing creation of new analyses and tools aiming to aid stakeholders in effectively interpreting data [48–50], we collected data from 82 healthcare organizations (research hospitals, teaching hospitals and local health authorities). By using a data-mining process to make the dataset more robust, thereby removing missing data and extreme values encompassing the top and bottom 10% of observations, we collected a dataset comprising 324 observations.

3.2. Data: dependent variable

The dependent variable used to represent at least a part of the healthcare organization's performance was LOS. LOS can be considered a reliable measure for assessing the efficiency with which a healthcare facility manages its services. A lower LOS value may be representative of skillful patient management, encompassing both clinical intricacies and resource allocation dynamics. Conversely, a higher LOS hampers efficiency, increasing delays in patient turnover and heightening the risk of complications; this drains resources and reduces the organization's ability to accommodate new admissions promptly [51,52]. The rationale behind implementing the LOS index was rooted in creating a ratio that compares the average duration of patient stays for individual admissions to the reference year, mean value recorded in 2016 for similar admission categories across different regions.

3.3. Data: independent variables

The main explanatory variable of interest was gender diversity. We collected data based on the personnel count provided by the Italian Ministry of Finance. To evaluate these data, we considered: the percentage of women who do not hold executive positions (WNEP) and the

Table 1
Variable identification, acronyms and measures.

Variable identification	Acronyms	Measures
(Dependent Variable)		
Main Variable		
Average length of stay	LOS	Sum of the differences between the effective and the expected length of stay for surgical DRGs on the number of discharges for surgical DRGs
(Independent Variables)		
Gender Diversity Variables		
Women in non-executive positions	WNEP	Non-executive female positions to total non-executive positions
Women in executive positions	WEP	Executive female positions to total executive positions
Control Variables		
Voluntary discharge	Vol dis	Voluntary discharges x 100 to the number of admissions
Day surgery	Day surg	Number of admissions made in day-surgery for surgical DRGs x 100 to number of admissions made in day-surgery and ordinary admissions for surgical DRGs
DRG at high risk of inappropriateness	DRG inap	Number of regular admissions for high-risk DRGs under regular hospitalization to number of regular admissions for non-high-risk DRGs
Organizational inappropriateness	Org inap	Number of discharges from surgical units with medical DRGs x 100 to number of discharges from surgical units
Case mix index	Case mix	Healthcare organization average of DRG weights to the national average of DRG weights
Research hospital	Res hosp	Dummy variable equal to 1 if the healthcare organization is a research hospital and 0 otherwise
Teaching hospital	Teach hosp	Dummy variable equal to 1 if the healthcare organization is a teaching hospital and 0 otherwise
Firm size	Size	Natural logarithm of the total number of employees

percentage of women who hold executive positions leading healthcare departments that are directly involved in patient care (WEP).

3.4. Data: control variables

LOS is a metric that captures the overall capacity of healthcare organizations to provide services efficiently. Many factors can affect this performance indicator, including quality of care and the appropriate use of resources. Concerning quality of care, the voluntary discharge of patients can be considered an indicator reflecting the perception of patients. It was noted that a higher proportion of voluntary discharges tend to receive lower service evaluations from the recipients themselves [53]. Moreover, it was also shown that higher levels of voluntary discharge in surgical wards are related to higher levels of in-hospital mortality rates [54].

Regarding the appropriate use of resources, common indicators related to LOS focus on the recourse to day surgery and the overall capacity to use the appropriate care setting in acute and ambulatory care. Day surgery procedures are characterized by their minimally invasive nature and emphasis on outpatient management. These procedures play an essential role in optimizing the duration of patient stays, aiming at minimizing the necessity for extended hospitalization and allowing patients to return home after surgery [55].

Therefore, the relationship between LOS and inappropriateness is closely intertwined, particularly in the context of diagnosis-related group (DRG) classifications. DRGs are utilized to group patients with similar clinical conditions and resource needs. One of the leading causes of DRG inappropriateness is DRG misclassification, which occurs when a patient is assigned to the wrong DRG due to coding errors or inadequate documentation. For instance, a patient admitted for a specific cardiac condition might be inaccurately coded for a different, less resource-intensive condition. Hence, patients admitted with an inappropriate DRG might experience extended hospitalization due to potential inaccuracies in resource allocation, diagnosis, or treatment planning [56].

Furthermore, to estimate the degree of organizational inappropriateness, we considered the surgical unit discharge of a patient with a medical DRG without the patient having undergone any intervention. This plays a crucial role as a confounding factor in assessing the complexity and severity of medical cases and, consequently, LOS. By incorporating this indicator as a control variable, the influence of inappropriate surgical admissions on the LOS can be effectively delineated, thus reducing the risk of misattributing variations [57].

Although we estimated LOS by summing up the differences between

the effective and the expected length of stay for each DRG, we included the case mix index to control for case complexity due to differences in the mix of DRGs among healthcare organizations [58,59]. Case mix can be positively associated with LOS, suggesting the average length of stay compared to the reference year increases as case complexity rises. Conversely, a negative relationship reveals that the average length of stay compared to the reference year decreases as complexity rises, signaling healthcare organizations improved efficiency in managing complex cases.

Furthermore, we included firm size and the type of healthcare organization as controls, distinguishing research hospitals from teaching hospitals. Table 1 presents the selected variables, their acronyms and measures.

3.5. Analysis

Analyses were performed using STATA software, version 17. To study the associations between gender diversity and LOS while controlling for confounders, we initially challenged the multicollinearity by implementing the variance inflation factor analysis; we then performed the Pearson correlation analysis. Subsequently, we proposed a linear specification of pooled ordinary least squares regression (pooled OLS) and random effect regression (RE). We initially employed a pooled OLS analysis to address individual heterogeneity. Following this, to control for unobserved observations, we performed RE. The reasons behind the implementation of RE instead of the fixed-effects regression analysis can be found in the results of the Hausman test, which suggested RE as the most appropriate approach ($\chi^2 = 11.36$, $p\text{-value} = 0.182$) and in the time invariance of several control variables. Furthermore, we introduced lagged independent variables as effective instruments to address potential endogeneity issues. This approach aligns with the principles of the generalized method of moments (GMM) technique, proposed by Arellano and Bond [60], which addresses endogeneity challenges in a dynamic setting by utilizing high-order temporal lags as instruments. However, applying the GMM technique requires a substantial number of observations, and our sample size was limited, preventing us from using this specific econometric approach in our study. Finally, we employed a quantile regression analysis to obtain a comprehensive picture of the dependent and independent variables at different points of the conditional distribution without requiring strong assumptions related to normality, outliers and homoskedasticity [61–63].

Table 2
Descriptive statistics and correlations.

	Mean	Std.Dev	Median	Min	Max	VIF	1	2	3	4	5	6	7	8	9	10	11
LOS	0.17	0.92	0.19	- 2.77	2.88		1	0.30***	- 0.07	- 0.11	0.20***	0.36***	0.41***	- 0.23***	- 0.03	0.27***	- 0.07
WNEP	0.72	0.06	0.74	0.54	0.84	3.73			0.38***	- 0.08***	0.11*	0.21***	- 0.28***	- 0.17**	0.10	0.10	- 0.14**
WEP	0.31	0.07	0.31	0.12	0.58	1.26				- 0.36***	0.01	0.15**	- 0.22***	- 0.06	0.17**	- 0.10	- 0.06
Vol dis	1.26	1.04	0.88	0.07	5.77	3.92				1	0.04	- 0.17**	0.42***	- 0.11*	- 0.15**	- 0.13*	0.10
Day surg	85.5	13.3	91.3	33.5	99.7	1.64					1	0.22***	0.23***	- 0.34***	- 0.09	- 0.30***	0.10
DRG inap	0.18	0.07	0.17	0.05	0.50	1.86						1	0.39***	- 0.22***	0.36***	0.23***	- 0.25***
Org inap	19.1	6.60	18.4	4.12	39.9	2.23							1	- 0.36***	0.04	0.27***	- 0.22***
Case mix	1.01	0.11	1.01	0.66	1.36	1.75								1	- 0.01	0.06	0.30***
Res hosp	0.08	0.27	0	0	1	2.18									1	- 0.25***	- 0.41***
Teach hosp	0.41	0.49	0	0	1	2.32										1	- 0.27***
Size	8.1	0.59	8.14	6.41	9.51	1.77											1

* $p < 0.05$,
 ** $p < 0.01$,
 *** $p < 0.001$.

4. Results

Table 2 reports the descriptive statistics and correlations regarding gender diversity, the control variables, and the dependent variable. The mean value of LOS is approximately 0 days, while the minimum and maximum values are approximately -3 and 3 days, respectively. Thus, on average, LOS is close to the expected one. WNEP varies from a minimum of 54% to a maximum of 84%, with an average value of 73%; conversely, the WEP mean value is 31%, while the minimum and maximum values are approximately 12% and 58%, respectively. Hence, evidence suggests a significant gender imbalance: the majority of women employees occupy lower-level positions, whereas there is a notable underrepresentation of women in upper management roles.

The variance inflation factor analysis indicates the absence of collinearity since any value is higher than 10 [64]. Moreover, considering the correlations among the variables, WNEP has a positive relationship with LOS. Similarly, the correlation analysis highlights that both DRGs at high risk of inappropriateness, along with organizational inappropriateness, have a positive correlation with LOS and that case mix negatively correlates with LOS. Table 3 presents the regression results by which LOS is regressed on gender diversity and the control variables. Consistent with OLS, RE shows that, among the control variables, WNEP has a statistically significant positive relationship with LOS ($\beta=5.822$, $p\text{-value}=0.000$) and that WEP has a statistically significant negative relationship with LOS ($\beta=-1.211$, $p\text{-value}=0.039$).

Table 3
The effect of variables on LOS: pooled OLS and RE regression results.

	Pooled OLS		RE	
	b	SD	b	SD
WNEP	8.440***	(1.198)	5.822***	(1.589)
WEP	- 1.791**	(0.613)	- 1.211*	(0.586)
Vol dis	0.143	(0.076)	0.132	(0.072)
Day surg	0.002	(0.004)	0.001	(0.003)
DRG inap	1.756*	(0.734)	2.304**	(0.702)
Org inap	0.060***	(0.009)	0.041***	(0.008)
Case mix	0.280	(0.464)	- 1.625***	(0.456)
Res hosp	- 0.103	(0.217)	0.063	(0.366)
Teach hosp	0.177	(0.124)	0.238	(0.197)
Size	0.189*	(0.090)	0.262	(0.154)
Constant	- 9.042***	(1.348)	- 5.761**	(1.849)
Firm fixed effect	No		Yes	
Time effect	No		Yes	
Observations	324		324	
R-Squared	0.410		0.363	

* $p < 0.05$,
 ** $p < 0.01$,
 *** $p < 0.001$.

Furthermore, RE evidences a positive statistically significant association between DRG inappropriateness ($\beta=2.304$, $p\text{-value}=0.001$), organizational inappropriateness ($\beta=0.041$, $p\text{-value}=0.000$) and LOS and a negative statistically significant association between case mix and LOS ($\beta=-1.625$, $p\text{-value}=0.000$).

Moreover, additional analyses were conducted to ensure the robustness of our findings. First, we explored the interaction between WNEP and WEP in conjunction with firm size, confirming the consistency of the previous results. Furthermore, we introduced lagged independent variables to address concerns related to endogeneity, potential selection bias issues, and reverse causality among the variables. The latter variables are effective instruments due to their correlation with the potentially endogenous variable while exhibiting a low correlation with the dependent variable [65–68]. The Cragg Donald Wald F-statistic exceeds the Stock Yogo critical value weak identification test at the 10% level, supporting the implementation of the instrumental variables [69]. The Sargan–Hansen test rejects the null hypotheses, revealing the instruments’ suitability (the results can be found in the supplementary materials, Appendix 2) [70]. The results highlight that LOS at time “t” is influenced by the prior representation of women in both executive and non-executive positions at time “t - 1.” This analytical approach strengthens the robustness of our findings, as it addresses potential endogeneity issues and highlights the importance of considering women’s representation at different organizational levels in the past to understand its impact on LOS. Finally, we implemented a quantile regression analysis to address normality, outliers, and homoskedasticity issues. The results are shown in Table 4.

Consistent with OLS and RE, the quantile regression analysis demonstrates that, among the control variables, WNEP has a statistically significant positive relationship with LOS at every point of the conditional distribution and that WEP has a statistically significant negative relationship with LOS from the 50th quantile.

Furthermore, the quantile regression analysis evidences a positive statistically significant relationship from the 30th quantile to the 50th quantile between DRG inappropriateness and LOS and a negative statistically significant relationship at the 80th quantile between day surgery and LOS. Notably, there is a positive and significant relationship between organizational inappropriateness and LOS for every point of the conditional distribution, as well as a negative and significant relationship between research hospitals and LOS from the 20th quantile to the 50th quantile. The relationship between case mix and LOS is no longer significant, thus invalidating the argument that healthcare organizations are more efficient for highly complex cases compared to the reference year.

Table 4
Quantile regression results.

	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Q20	Q30	Q40	Q50	Q60	Q70	Q80
WNEP	6.747** (2.220)	5.902** (1.901)	7.327*** (1.596)	8.648*** (1.454)	9.552*** (1.425)	11.23*** (1.579)	11.86*** (1.638)
WEP	0.547 (1.150)	- 0.409 (0.984)	- 0.775 (0.827)	- 1.823* (0.753)	- 2.033** (0.738)	- 2.196** (0.818)	- 2.285** (0.848)
Vol dis	0.176 (0.141)	0.071 (0.120)	0.115 (0.101)	0.103 (0.092)	0.116 (0.090)	0.161 (0.100)	0.155 (0.104)
Day surg	0.001 (0.007)	0.006 (0.006)	- 0.001 (0.005)	- 0.003 (0.005)	- 0.003 (0.005)	- 0.007 (0.005)	- 0.013* (0.005)
DRG inap	1.978 (1.388)	2.465* (1.188)	2.390* (0.998)	1.819* (0.910)	1.106 (0.891)	1.048 (0.987)	1.748 (1.024)
Org inap	0.065*** (0.017)	0.062*** (0.014)	0.063*** (0.012)	0.068*** (0.011)	0.061*** (0.011)	0.065*** (0.012)	0.069*** (0.012)
Case mix	0.042 (0.874)	0.315 (0.749)	0.697 (0.629)	0.751 (0.573)	0.368 (0.561)	0.536 (0.622)	1.122 (0.645)
Res hosp	- 0.910* (0.400)	- 0.931** (0.343)	- 0.879** (0.288)	- 0.579* (0.262)	- 0.425 (0.257)	- 0.255 (0.285)	- 0.177 (0.295)
Teach hosp	0.154 (0.232)	0.153 (0.198)	0.015 (0.167)	0.044 (0.152)	0.167 (0.149)	0.156 (0.165)	- 0.019 (0.171)
Size	0.029 (0.166)	- 0.028 (0.142)	- 0.108 (0.120)	- 0.054 (0.109)	0.001 (0.107)	0.041 (0.118)	0.174 (0.122)
Constant	- 7.587** (2.497)	- 6.642** (2.138)	- 6.520*** (1.795)	- 7.227*** (1.636)	- 7.449*** (1.603)	- 8.736*** (1.775)	- 10.19*** (1.842)
Industry effect	yes	yes	yes	yes	yes	yes	yes
Time effect	yes	yes	yes	yes	yes	yes	yes
R-squared	0.251	0.243	0.242	0.244	0.261	0.279	0.311
Observations	324	324	324	324	324	324	324

* $p < 0.05$,
 ** $p < 0.01$,
 *** $p < 0.001$.

5. Discussion

The findings suggest that WNEP is positively related to LOS (the higher the WNEP ratio, the higher the LOS), while WEP is negatively associated with LOS (the higher the WEP ratio, the lower the LOS). There are several potential explanations for this seemingly controversial result. Interpreting the relationship between gender diversity and LOS not as a direct cause-effect relationship but as a complex interplay of several dynamics, one of the main reasons may be that gender diversity fosters communication and patient-centered care, leading to faster and more accurate diagnoses [71–73]. According to the resource dependence theory, another possible reason can be found in the ability of a diverse healthcare team with a broad range of experiences and perspectives to manage complex decisions and ensure adequate treatment adherence. Similarly, a possible explanation could be linked to the capability of heterogeneity to reduce information asymmetry and increase the monitoring functions hampering knowledge sharing and providing value to organizational performance [74–77]. These dynamics can contribute to faster recovery and thus reduce LOS, as patients’ overall well-being is considered, leading to better outcomes.

Notably, we found a positive relationship between organizational inappropriateness and LOS for every point of the conditional distribution. This result strengthens the identification of organizational inappropriateness as one of the primary dynamics affecting LOS. Embedding the length of stay of a bed in a surgical unit, a higher average length of stay relative to a medical unit provides an organizational inefficiency, resulting in higher unjustified costs. In addition, DRG inappropriateness due to misassignment leads to an increased average length of stay, reinforcing the importance of paying attention to organizational inefficiencies [56,57,78].

By applying different statistical tests and analyses, which confirmed the robustness of the findings, the present study contributes to the literature by providing insights into the complex relationship between gender diversity and healthcare performance. This study highlights the importance of looking at both executive and non-executive positions in diversity management, encouraging policymakers to address inefficiency by focusing on workforce composition. In particular, this research expands the literature that emphasizes the importance of valuing women at the executive level [42–47], showing how women executives who are more inclined to adopt transformational leadership styles can positively impact organizational outcomes [44,79]. However, at the same time, it highlights how this outcome lies when the workforce composition is heterogeneous at both levels. Moreover, it is one of the few studies aimed at analyzing gender diversity by enforcing healthcare metrics.

Study limitations open up intriguing avenues for further investigations. First, the lack of evidence that the data can be generalized to different contexts places limitations in terms of external validity. Additionally, because IRPES is based on a voluntary initiative, there could be a bias due to self-selection. Second, despite the application of IRPES, which provides distinct advantages in assessing healthcare organizations, the study lacks control over the diverse cultures and policies prevalent in different regions. Third, we used sex as a proxy for gender, thus considering the biological sex instead of the gender identity. Fourth, while valuable, the scope of this research is not exhaustive and cannot comprehensively grasp all potential control variables related to LOS, potentially introducing variable omission biases. Finally, as just evidenced by Naciti et al. [47], while the assessment of women’s representation may be useful in the context of small teams and groups or when examining highly unbalanced contexts like the healthcare sector, gender studies in large organizations could benefit more from a gender diversity approach. In these cases, the use of diversity measures such as the Blau index could be suited [30,80].

Moreover, the analysis investigates efficiency measures, hence, different indexes could lead to divergent results. Further research could explore the relationship between gender diversity and different healthcare performance dimensions, such as quality of care or patient satisfaction. Furthermore, instead of focusing on quantitative investigation, qualitative research aimed at enhancing our understanding of the connection between gender diversity and healthcare performance could facilitate a deeper exploration of this topic.

6. Conclusion and practical implications

This study underscores the role of gender diversity in shaping healthcare performance, particularly in the context of LOS. The observed relationship between the percentage of women in different positions and LOS highlights the nuanced impact of gender diversity on healthcare metrics. While a higher representation of women in non-executive roles appears to be associated with an increase in LOS, the reverse is true for executive positions. These findings not only emphasize the importance of gender diversity initiatives but also suggest the need for a tailored approach, recognizing the unique dynamics at various organizational levels. In line with the Horizon Europe Guidance on Gender Equality Plans and SDG 5, the findings reveal that increasing the number of women at the executive level might have a positive impact on healthcare performance in the Italian healthcare sector. However, it also calls attention to making healthcare positions more attractive to men, promoting diversity across the spectrum. In conclusion, our research

shows that focusing on gender diversity and adopting healthcare performance measures can improve the understanding of the relationship and the task-related effects of workforce composition. We expect to contribute to the literature by helping policymakers foster even more on heterogeneity, empowering under-represented genders, and suggesting a rise in the number of women in leadership and decision-making positions.

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CRedit authorship contribution statement

D. Trinchese: Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **M. Vainieri:** Writing – review & editing, Investigation, Conceptualization. **P. Cantarelli:** Writing – review & editing.

Declaration of competing interest

The authors declare no conflicts of interest.

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Supplementary materials

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