Health policy 172 (2026) 105693

Contents lists available at ScienceDirect

Health policy

journal homepage: www.elsevier.com/locate/healthpol

Corruption and public healthcare quality in the European Union: Evidence from Europe's regions

Andreas P. Kyriacou [a,*], Oriol Roca-Sagalés [b]

[a] Departament d'Economia, Universitat de Girona, Edifici Econòmiques, C/ de la Universitat de Girona, 10, Campus Montilivi, 17003, Girona, Spain
[b] Departament d'Economia Aplicada, Universitat Autònoma de Barcelona, Edifici B, Bellaterra, 08193, Barcelona, Spain

ARTICLE INFO

JEL classification:
D73
H51
H75
I18

Keywords:
Corruption in public healthcare
Bribery
Public healthcare quality
Regional-level analysis
European Union

ABSTRACT

Background: Corruption in the public healthcare sector can undermine the efficient allocation of resources and negatively affect health outcomes. In the European Union (EU), it may take several forms including bribes to medical professionals in return for medical attention, public procurement corruption, or improper relationships between healthcare staff and suppliers of drugs or equipment. However, empirical evidence on its impact remains limited.
Objective: This study aims to assess the relationship between corruption in public healthcare and the quality of public healthcare services across EU regions.
Methods: Using data from 165 regions in 19 EU countries over the period 2010 to 2021, we conduct a quantitative panel analysis based on perceptions-based measures of corruption in public healthcare and the quality of public health services. To address endogeneity concerns, we apply fixed effects, instrumental variable techniques, and control for a broad range of potential confounders.
Results: The results suggest that corruption in public healthcare may undermine the quality of public healthcare services.
Conclusions: These findings suggest that targeted anti-corruption efforts should be a priority for policymakers seeking to improve healthcare quality in regions where corruption is more prevalent.

Research in context box

What is already known about the topic?

Corruption is widely understood to hinder the performance of public healthcare systems by distorting resource allocation and reducing service quality. In the European Union (EU), it commonly involves bribery in medical service delivery, procurement-related corruption, and inappropriate ties between healthcare professionals and industry. However, despite these concerns, systematic empirical evidence on the relationship between corruption and public healthcare quality in the European Union remains scarce.

What does this study add to the literature?

This study fills a significant evidence gap by providing a quantitative analysis of the relationship between corruption in public healthcare and public healthcare quality across 165 regions in 19 EU countries.

What are the policy implications?

To improve healthcare quality in corruption-affected areas, policymakers should prioritize anti-corruption efforts. Effective measures include enhancing judicial independence, adopting best-practice anti-bribery laws, improving transparency in procurement and service delivery, regulating industry–provider relationships, and establishing mechanisms for reporting corruption.

1. Background

Corruption is the misuse of public authority for private gain. Corruption in the public healthcare sector includes taking bribes when awarding public procurement contracts or in exchange for providing medical services to patients that should be free, revolving door corruption and regulatory capture involving public administrators and the

* Corresponding author.
E-mail addresses: andreas.kyriacou@udg.edu (A.P. Kyriacou), oriol.roca@uab.cat (O. Roca-Sagalés).

https://doi.org/10.1016/j.healthpol.2026.105693
Received 17 April 2025; Received in revised form 2 March 2026; Accepted 5 July 2026
Available online 9 July 2026
0168-8510/© 2026 The Author(s). Published by Elsevier B.V. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

private health industry, and improper marketing relations between pharmaceutical and medical device companies on the one hand, and healthcare professionals on the other [1,2].

Corruption can undermine health outcomes because it implies the provision of health services on the basis of the private interest of healthcare professionals or authorities rather than needs-based criteria applied to patients something that, ultimately, leads to the inefficient use of public health resources [1,3]. The health sector is particularly vulnerable to corruption due to pervasive uncertainty, strong information asymmetries, and the multiplicity of actors involved [4]. There is uncertainty about who will fall ill, when illness will occur, what kind of illness, and how effective are treatments. This makes it difficult for those demanding medical care to discipline providers. Uncertainty is not symmetrically distributed. Information is asymmetrically shared among healthcare actors: providers are better informed of the technical features of diagnosis and treatment than patients, pharmaceutical companies know more about their products than doctors, individuals have information about their health not available to healthcare providers or insurers. The presence of a large number of actors – government regulators, payers (social security institutions, private insurers), providers (medical staff), suppliers (medical equipment, pharmaceutical companies) and consumers – increases complexity, reduces transparency and creates opportunities for corruption (see also [5,6]).

A range of cross-country studies employing world-wide samples have linked corruption to higher child and infant mortality, lower immunization rates and life expectancy (see, for example [7–12]). Regional studies in Africa [13,14], the Arab World [15], and post-Socialist states [16] reinforced these findings. Within-country analyses in the Philippines [5], Italy [17], and Turkey [18] further highlighted corruption's detrimental role across a range of health indicators including the efficiency of public procurement in healthcare, life expectancy, infant mortality, and public health service satisfaction, with disproportionate impacts on vulnerable populations. One potential drawback of almost all the cross-section studies is that they employ indicators that reflect the general prevalence of corruption in the societies studied, rather than corruption in public healthcare per se. The exception is Habibov [16] who measures corruption it terms of individual responses to the question of whether an unofficial payment was made, or gift was given, to public healthcare personnel in the last 12 months. This more fine-grained approach has also been taken by Azfar & Gurgur [5] who gather survey evidence of corruption in public health at the municipal level.

In this article, we will exploit cross-regional data from the European Union (EU) to consider the relationship between perceived corruption in public healthcare provision and the perceived quality of public healthcare. There is a high degree of variation in perceived corruption in public healthcare provision across Europe's regions. In the sample we exploit in this article, covering 165 regions drawn from 19 member states over the period 2010–2021, the region with the highest levels of corruption in public healthcare (Kontinentalna Hrvatska region in Croatia in 2017) has a health corruption indicator four times greater than that with the lowest level (Åland region in Finland in 2013). There are also considerable within-country differences in corruption scores across regions (notably but not only, in Spain and Italy). At the same time, perceptions concerning the quality of public healthcare vary significantly across Europe's regions: the public healthcare quality variable we employ ranges from 3.7 to over 8, with some Bulgarian regions (Yugoiztochen and Severen Tsentralen in 2010) at the lower end and one Finnish region (Åland in 2021) and one Spanish region (País Vasco in 2021) at the higher end. This variability is also observed among the regions of the same country, particularly in Italy, Spain and France. Consequently, considering the extent to which corruption in public healthcare can affect public healthcare quality seems a worthwhile enterprise.

By exploiting cross-regional variation across Europe, our approach is similar to Rönnerstrand and Lapuente [19] who examine the association between corruption in the public healthcare sector and the consumption of antibiotics across Europe's regions finding that corruption increases antibiotics consumption possibly because of improper market relationships between medical professionals and drug companies. Our study complements country case studies on corruption in the health sector across the EU [20,21]. These studies identified six main typologies of healthcare corruption: bribery in medical service delivery, procurement corruption, improper marketing relations, misuse of high-level positions, undue reimbursement claims, and fraud or embezzlement of medical products. Bribery in medical service delivery emerged as the most visible and persistent form, especially in Central and Eastern Europe, driven by factors such as low salaries, weak oversight, and cultural acceptance. But what is the relationship between corruption in healthcare and the quality of health services in the EU? This is a question we will attempt to answer in the remainder of the article. In the next section we describe the data and empirical methodology that we adopt. We follow this with a presentation of the results and a discussion of the findings before concluding.

2. Methods

The variables used to quantify the quality of public healthcare services and the degree of corruption in their provision are drawn from the European Quality of Government Index (EQI), a large-scale survey explicitly designed to measure perceptions of governance and public service quality at the regional (NUTS1 and NUTS2) level across the European Union. The EQI is the largest survey of its kind, having collected responses from >330,000 individuals across 208 regions in 27 EU member states over multiple waves [22]. The EQI has been widely used by scholars to analyse the impact of regional governance quality on socio-economic outcomes and policy effectiveness within the EU [23].

The regional panel dataset used in our analysis – covering waves 2010, 2013, 2017 and 2021 – was provided directly to us by the EQI team and corresponds to the harmonized regional indicators constructed from the underlying survey data. This included weighing by age, gender and education when aggregating from the individual to regional levels. Moreover, because in some countries regional classifications changed across waves, a constant NUTS definition is applied for consistency. From this dataset we extract the variable 'Hel_qual' that asks people to rate the quality of public healthcare services in their area (region) on a scale from '1′ (extremely poor quality) to '10′ (extremely high quality). This is our dependent variable, and we label it 'Quality of the public healthcare system in the region'. In our sample of European regions, it ranges from 3.69 to 8.18 with a mean value of 6.38. Regions with higher values include FI20-Åland, ES21-País Vasco, BE2-Flanders, AT34-Vorarlberg, ITH2-Trento, and AT33-Tirol; those around the mean include PT30-Região Autónoma da Madeira, RO11-Nord-Vest, and PT16-Centro; and the regions with the lowest perceived public healthcare quality are located in Bulgaria, (BG34-Yugoiztochen, BG32-Severen Tsentralen, BG42-Yuzhen Tsentralen, BG41-Yugozapaden, BG31-Severozapaden), Greece (EL4-Nisia Aigaiou, Kriti) and Italy (ITF6-Calabria).

To measure corruption in the provision of public healthcare services we rely on the variable 'Helcorr' that asks people whether they agree with the statement that corruption is prevalent in the public healthcare system in their area (1 disagree to 10 agree). We label this variable as 'Corruption'. In our sample of European regions, it ranges from 1.76 to 7.08 with a mean value of 4.25. Scandinavian regions have the lowest levels of corruption while the regions of the former socialist countries, Greece, and some Italian regions (ITF6-Calabria and ITF3-Campania) are the ones with higher levels of corruption in public healthcare (in the online appendix Table A.1 we define and identify the sources of all the variables employed in this article and in the online appendix Table A.2 we provide their summary statistics).

The overlap between EQI and a set of control variables discussed below, yields an unbalanced panel of up to 165 EU regions from 19 EU countries over the period 2007 to 2021, including 6 countries with NUTS

1 regions (Belgium, Germany, Greece, Hungary, Netherlands and Sweden) and 13 with NUTS 2 regions (Austria, Bulgaria, Croatia, Czech Rep., Denmark, Finland, France, Italy, Poland, Portugal, Romania, Slovakia, and Spain).

For robustness purposes we employ two additional variables that capture the extent of impartiality in the provision of public healthcare services namely 'Helimpart1' and 'Helimpart2'. The first asks people to agree or disagree with the statement that certain people are given special advantages in the public healthcare system in their area (1 disagree to 10 agree), while 'Helimpart2' asks their opinion on the extent to which all citizens in their area are treated equally in the public healthcare system (1 agree to 4 disagree). These variables are labelled as 'Special advantages' and 'Unequal treatment', respectively. The notion of impartiality and equal treatment is synonymous with good governance that implies treating people in the same empirical situation equally and making public decisions following explicit rules and procedures and without regards to personal preferences, relationships, and interests [24,25]. Obviously, because corruption implies the use of public resources or authority for personal benefit, it is diametrically opposed to impartiality.

As can be appreciated in Fig. 1, the relationship between public healthcare quality and corruption in public healthcare in our sample is negative as expected.

To rigorously explore this relationship, we estimate the following empirical model:

$$HQ_{rt} = \alpha_1 + \alpha_2 CH_{rt} + \alpha_3 X_{rt} + \alpha_4 Z_{ct} + \tau_t + \mu_c + \varepsilon_{rt} \quad (1)$$

where r = 1,…,165 refer to regions, c = 1,…,19 to countries, and t = 1,…,4 to time-periods respectively; HQ_{rt} represents the variable that measures the quality of public healthcare services at the regional level (Health Quality); CH_{rt} refers to the variables that measure corruption in public healthcare services (corruption or lack of impartiality) at the regional level; X_{rt} and Z_{ct} are, respectively, vectors of regional and national level control variables; and ε_{rt} an error term. We include period fixed effects (τ_t), to account for the impact of time varying factors common to all regions, and country fixed effects (μ_c) to account for the influence of time constant factors specific to each country.

The models are estimated by way of OLS based on panel corrected standard errors (PCSE) that are robust to heteroscedasticity and serial correlation between the residuals of a given cross-section (Period SUR). This approach does not address the possibility of reverse causality whereby individuals who perceive public healthcare quality to be lower may attribute this to greater corruption in the public healthcare system. To deal with reverse causality, we employ Two-Stage-Least-Squares (TSLS) regressions and employ lagged values of the corruption variables as instruments.

Our choice of control variables, both at the national and regional level, is ultimately guided by the need to reduce omitted variable bias. We present first the national level controls. We control for public and private health spending since it may be associated with the quality of public healthcare services and, moreover, it could be correlated with corruption in public healthcare. Moreover, we control for the decentralization of health spending down to the regional or local government levels because previous work has linked these to systematic variation in health outcomes [26,27]. Fiscal decentralization more generally, has also been linked to lower corruption within countries under certain conditions [28]. Because decentralization of health spending does not necessarily imply that regional governments have decision-making authority, we moreover control for this based on Hooghe et al's [29] Regional Authority Index. At the regional level we control for GDP per capita (logs), population (logs), population +65 (as a share of total population), and doctors (per 1000 inhabitants). GDP per capita, measured here in constant EUR and PPP terms to account for differences in the cost of living, has been related to better health outcomes (see, for example [30,31]), and because it is a strong predictor of control of corruption [32]. Regional population can proxy for potential economies of scale in the provision of public healthcare while the population above 65 years of age can account for the greater use of healthcare services in the region. Finally, we control for the number of doctors at the regional level. This variable includes doctors in both the public and private sectors and can help account for differential spending in public and private health across regions.

Given the availability of the EQI variables, we average all the time variant control variables so that they coincide with four multi-year periods starting in 2007 and ending in 2021 (2007–10, 2011–13, 2014–17, 2018–21). For most countries we have the full four observations over time for all regions. For 48 regions in 7 countries, we have just three observations over time. We match these averages to the corresponding value of the EQI index at the end of each multi-year period. This allows fiscal policy variables to impact on public healthcare perceptions with a lag of up to four years. Of course, this reduces the number of observations compared to an analysis based on yearly data, but this approach is taken due to the temporal availability of the EQI variables.

3. Results

Table 1 presents the empirical estimates. Each column pair corresponds to a different public healthcare corruption indicator: columns 1 and 2, employ the corruption measure while columns 2–3 and 3–4 employ, respectively, the indicators capturing special advantages and

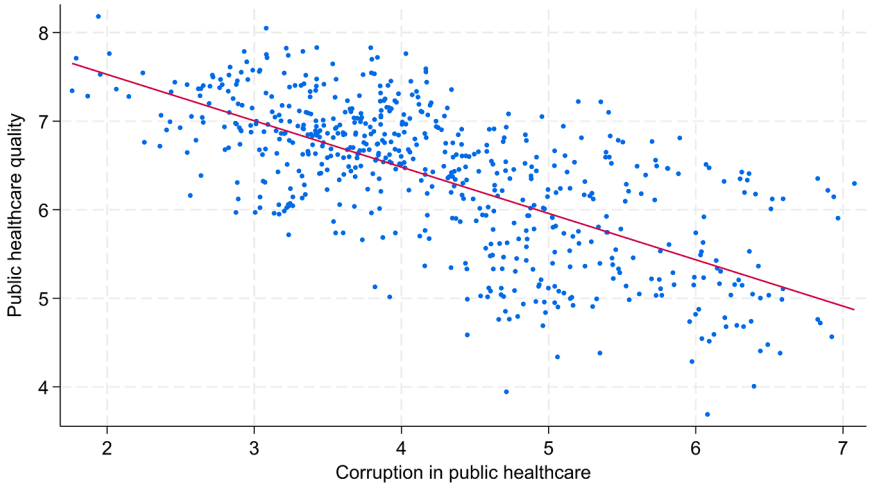

Fig. 1. Corruption and quality in the public healthcare system.

Table 1
Regional public healthcare quality and corruption.

Regional public healthcare corruption indicator=>	Dependent variable: Quality of the public healthcare system in the region					
	Corruption (1–10)		Special advantages (Absence of impartiality: 1–10)		Unequal treatment (Absence of impartiality: 1–4)	
	OLS (1)	TSLS (2)	OLS (3)	TSLS (4)	OLS (5)	TSLS (6)
Public healthcare corruption – Region	−0.438***	−1.300***	−0.146***	−2.108	−1.147**	−3.204***
	(0.042)	(0.212)	(0.045)	(1.092)	(0.108)	(0.471)
Public health expenditure (euros pc)	−0.283*	0.243	−0.235	0.306	−0.329**	−0.350
	(0.147)	(0.261)	(0.157)	(0.427)	(0.142)	(0.228)
Private health expenditure (euros pc)	0.258	−0.562	0.223	−0.637	0.442**	0.475
	(0.229)	(0.448)	(0.234)	(0.742)	(0.224)	(0.386)
Decentralization of health spending to local level	−1.122**	1.147	−1.291**	2.186	−1.498***	0.405
	(0.553)	(1.460)	(0.558)	(2.684)	(0.547)	(1.193)
Decentralization of health spending to regional level	2.5441	−6.422**	4.111*	−11.732	4.683***	−1.572
	(2.094)	(3.191)	(2.192)	(8.365)	(1.885)	(2.497)
Regional Authority Index	0.147***	0.062	0.146***	0.125	0.193***	0.069
	(0.035)	(0.061)	(0.036)	(0.114)	(0.033)	(0.048)
GDP pc PPP (in logs) – Region	0.515***	0.067	0.728***	−0.125	0.455***	0.064
	(0.098)	(0.166)	(0.116)	(0.531)	(0.091)	(0.142)
Population (in logs) – Region	0.062**	0.155***	0.038	0.234**	0.035	0.055**
	(0.025)	(0.033)	(0.030)	(0.109)	(0.023)	(0.021)
Population +65 (in %) – Region	0.024***	0.154***	0.037***	−0.007	0.018***	0.001
	(0.008)	(0.033)	(0.010)	(0.031)	(0.007)	(0.010)
Doctors (per 1000 inhab.) – Region	−0.034	0.070	−0.090**	0.072	−0.038	−0.001
	(0.034)	(0.047)	(0.040)	(0.110)	(0.031)	(0.032)
Constant	−1.296	2.879***	−4.679	16.451	−0.182**	12.635***
	(1.347)	(2.813)	(1.614)	(11.147)	(1.379)	(2.961)
Adjusted R^2	0.766	0.682	0.721	0.216	0.792	0.819
Regions	165	165	165	165	165	165
Observations	612	456	612	456	612	456
First stage F-statistic		98.329		35.712		44.765

Notes: All regressions report PCSE in parentheses and include country and period fixed effects. Level of significance: 10% (*), 5% (**), and 1% (***). TSLS regressions employ the lagged value of the regional public healthcare corruption indicator as an instrument.

unequal treatment in public healthcare provision. We report both the OLS and the TSLS estimates. The control variables are in line with the findings reported by previous work. Decentralizing health spending tends to worsen public healthcare quality while greater regional autonomy more generally has the opposite effect. Greater regional wealth, more populous regions and an older population imply greater perceived public healthcare quality. On the other hand, the link between more doctors per capita and healthcare quality is more tenuous perhaps because the impact of doctors depends more on qualitative factors [33].

Turning now to the main variables of interest, we find that corruption or the absence of impartiality when providing public healthcare is negatively associated with the quality of public healthcare system in a region. The negative association of corruption on healthcare quality is both statistically and economically significant. In terms of the latter, focusing on the estimated in column 1, a one standard deviation increase in the perceived corruption is associated with a reduction in the perceived quality of public healthcare services of 0.476, which is >58 per cent of a standard deviation of the public healthcare quality measure. The strength of the instrumental variables employed is indicated by the first stage F-statistics which are always larger than the recommended critical value of 10 [34]. Based on the TSLS estimate reported in column 2, a one standard deviation increase in perceived corruption is linked to a reduction in the perceived quality of public healthcare services by 1.413 which represents 1.725 standard deviations of the public heath indicator.

It could be that some of the controls we employ are part of the causal pathway we are studying and so including them in the regression may "over-control" and reduce the estimated importance of corruption. Arguably this could be the case for GDP per capita, health spending, fiscal decentralization and the number of doctors. Corruption in public healthcare could potentially impact these variables and, these in turn could impact public healthcare quality. To explore this, we re-estimate columns 1 and 2 after dropping either all of them, or each of them separately. The overall picture that emerges is similar to that reported in Table 1 (results not shown but available upon request).

Our empirical results, after accounting for a range of potentially confounding national and regional level variables as well as the possibility of reverse causality, indicate that corruption may undermine public healthcare quality. Given the use of multi-year intervals rather than yearly data, employing lagged values as instruments in a TSLS framework helps mitigate concerns about endogeneity by reducing the likelihood of reverse causality and contemporaneous shocks influencing both the independent variable and the outcome. To further allay concerns that may persist regarding the exogeneity of our instrumental variables, we employ alternative instruments. Specifically, we turn to lagged values of perceived corruption in alternative policy areas, namely public education and law enforcement by police, across the different regions (see the online appendix A.1 for definitions). Arguably, whereas individuals who perceive public healthcare quality to be low may attribute this to corruption in public healthcare, it is less likely that their dissatisfaction with the quality of public healthcare would lead them to expect corruption in other areas, unrelated to health. As can be appreciated in Table 2, the estimated negative association between public healthcare corruption and public healthcare quality persists and, if anything, is even greater. This said, it could still be the case that their dissatisfaction with public services in one area could lead people to perceive the public sector as generally corrupt. Thus, in the absence of truly exogenous instrumental variables the risk of reverse causality persists. As such, while our results suggest that corruption in public healthcare may undermine the quality of public healthcare, they should not be interpreted as definitive evidence of a causal effect.

To further assess the robustness of our findings, we turn to the individual-level data that we extract from the original EQI surveys. While our main analysis relies on region-level averages, the underlying surveys provide repeated cross-sections of individuals nested within regions and survey waves. Exploiting this micro-level variation allows us to examine whether the relationship between perceived corruption in public health and perceived healthcare quality holds when using the full

Table 2
Alternative instruments.

Regional public healthcare corruption indicator=>	Dependent variable: Quality of the public healthcare system in the region					
	Corruption (1–10)		Special advantages (Absence of impartiality: 1–10)		Unequal treatment (Absence of impartiality: 1–4)	
	(1)	(2)	(3)	(4)	(5)	(6)
Public healthcare corruption – Region	−1.341***	−1.392***	−1.030	−1.145*	−4.308***	−4.219***
	(0.231)	(0.279)	(0.634)	(0.686)	(1.148)	(1.526)
Adjusted R^2	0.668	0.648	0.675	0.645	0.705	0.717
Regions	165	165	165	165	165	165
Observations	456	456	456	456	456	456
First stage F-statistic	97.249	95.215	35.802	35.776	41.878	41.373

Notes: All regressions are TSLS, report PCSE in parentheses and include country and period fixed effects, a constant, and all the control variables from Table 1 (not shown). Level of significance: 10% (*), 5% (**), and 1% (***). The instrumental variables employed in each model are the lagged values of, respectively, corruption, special advantages and unequal treatment in public education (1, 3 and 5), and in law enforcement by the police (2, 4 and 6).

distribution of individual responses within each region-year. We estimate the following model:

$$HQ_{irw} = \beta_1 + \beta_2 CH_{rw} + \beta_3 X_{rw} + \beta_4 Z_{cw} + \delta_w + \delta_r + + \eta_{irw} \quad (2)$$

where i is the individual, r is the region, w is the wave, X_{rw} and Z_{cw} are, respectively, matrices of time variant regional and country level variables, and δ_w and δ_r are, respectively, wave and region fixed effects. In this specification, the dependent variable is the individual assessment of public healthcare quality, and the key explanatory variable captures perceived corruption in public health at the regional level. Measuring perceived corruption in public health at the regional rather than the individual level helps ensure consistency with the baseline regional panel specification, while also mitigating same-source bias and reverse causality that could arise if both corruption and perceived healthcare quality were measured at the individual level. We include wave and region fixed effects to absorb common shocks across survey waves and time-invariant regional characteristics. Standard errors are clustered at the regional level to account for within-region correlation. The individual-level specifications are estimated on 160 regions, slightly fewer than the 165 regions included in the regional-level panel analysis. The panel data are harmonized to a stable NUTS classification across waves. Because the survey micro-data reflect NUTS revisions over time (see [22]), a small number of regions cannot be consistently tracked over time under a fixed territorial definition and are therefore excluded from the individual-level regressions.

Table 3 reports the results from the individual-level specifications. The estimates confirm the negative association between public healthcare corruption and perceived public healthcare quality. These findings reinforce our earlier results and suggest that corruption in public healthcare may undermine the quality of public healthcare provision, as perceived by citizens.

Table 3
Individual-level perceptions.

Regional public healthcare corruption indicator=>	Dependent variable: Individual-level perceived quality of the public healthcare system		
	Corruption (1–10)	Special advantages (Absence of impartiality: 1–10)	Unequal treatment (Absence of impartiality: 1–4)
Public healthcare corruption - Region	−0.179**	−0.042	−0.831***
	(0.068)	(0.056)	(0.189)
Controls	YES	YES	YES
Region FE	YES	YES	YES
Wave FE	YES	YES	YES
Adjusted R^2	0.119	0.118	0.120
Regions	160	160	160
Observations	179,865	179,865	179,865

Notes: All regressions use individual-level data from repeated cross-sections, report robust standard errors clustered at the regional level, and include all the control variables from Table 1 (not shown). Level of significance: 10% (*), 5% (**), and 1% (***).

4. Discussion

In this paper, we analyze the relationship between corruption in public healthcare and the quality of public healthcare services in the EU drawing on evidence at the regional level. We would argue that our regional approach is crucial. Working with national health averages ignores the large subnational level disparities existing in both the perceived quality of health services and the level of corruption in public healthcare. Accordingly, drawing on regional-level health data can help identify the determinants of public healthcare quality, including the possible impact of corruption and, ultimately, contribute towards the elaboration of policies that can improve the quality of public healthcare in the EU.

Our analysis relies on perceived rather than objective measures of both corruption and public healthcare quality, and it is important to acknowledge that these are not equivalent. Perception-based indicators can be shaped by individual biases, expectations of what is appropriate and the influence of media coverage and public discourse [35–37]. Moreover, the use of perception-based measures raises concerns that the estimated relationships emerge because people who perceive corruption in public healthcare also tend to consider that public healthcare is deficient and vice-versa. The use of objective measures of corruption in public healthcare and public healthcare quality could help allay these concerns and is thus a worthwhile exercise for future research. On the other hand, perceptions-based measures can capture meaningful aspects of people`s experience that are often invisible and thus would be underestimated using objective measures – especially so in the case of corruption since it is illegal [38]. Perception-based measures are also more abundant, thus facilitating empirical exploration. Finally, with regards to the use of perception-based corruption measures, Charron [39] employs survey data based on 85,000 European respondents in 24 countries and reports a “remarkably high” consistency between actual reported corruption and citizen perceptions of corruption.

Our empirical design does not assume that NUTS regions necessarily correspond to autonomous health-policy-making governments. Rather, they represent territorially bounded administrative environments within which public healthcare is delivered and experienced. Even where formal health authority is centralized, implementation, procurement, monitoring, and service delivery operate through territorially organized structures — including hospitals, regional health agencies, local administrative offices, and enforcement bodies — whose integrity and oversight capacity may vary across space. Accordingly, regional variation in perceived healthcare corruption reflects differences in these implementation environments, not solely formal legislative authority. This interpretation is supported by descriptive evidence showing meaningful cross-regional dispersion in perceived public healthcare

corruption not only in decentralized systems such as Spain and Italy, but also in more centralized systems including France, Portugal, and the Netherlands (see Online Appendix Table A.3). Moreover, the persistence of the negative association between corruption and healthcare quality after controlling for fiscal decentralization in health spending and the Regional Authority Index indicates that the relationship is not driven exclusively by formal regional competencies, but by broader territorial differences in governance and implementation capacity. In this sense, NUTS regions serve as analytically meaningful territorial units that allow us to identify systematic spatial heterogeneity in governance outcomes within countries.

Finally, it has previously been argued that cultural values could be an important variable when calibrating the effect of corruption on health outcomes and, consequently, omitting culture from empirical models can give rise to spurious results [19]. This is a real possibility. Consider for example the power-distance cultural dimension proposed by Hofstede [40] that reflects on the extent to which the less powerful members of society expect and accept that power is distributed unequally. In our sample, countries with a very high power-distance score include Slovakia and Romania (100 and 90 on a variable that ranges from 0 to 100) and ones where the power-distance score is very low include Austria and Denmark (11 and 18 respectively). Arguably, in societies where power-distance is large, patients are both less likely to protest when health services are deficient, and more likely to pay bribes in exchange for medical services. Thus, in the absence of this cultural dimension in the estimated models, the effect of culture on public healthcare quality is likely to be partly captured by the estimated effect of corruption or, in other words, the estimated effect of corruption is likely to be larger than it would be if culture was appropriately controlled for. This would be important from a policy perspective since it would imply that effective strategies should go beyond institutional reform and law enforcement by also addressing the underlying social norms that sustain corrupt behavior. This said, our estimates address the potentially confounding effect of culture to some extent. In particular, the inclusion of country fixed effects in the regional panel regressions and region fixed effects in the individual-level regressions helps account for unobserved, slowly changing country- or region-specific characteristics, such as cultural dimensions [41]. Controlling for regional GDP per capita also helps account for cultural differences across regions given the established link between economic development and cultural variables [42]. This said, and data permitting, future work should explore this issue further through appropriate regional level cultural indicators.

5. Conclusion

Country-specific case studies conducted across EU member states have underscored the pervasive nature of corruption within healthcare systems, identifying recurrent manifestations such as bribery in the provision of medical services, irregularities in the public procurement processes for medical devices and pharmaceuticals, and inappropriate marketing practices. Despite this, empirical evidence on the relationship between corruption and healthcare outcomes within the EU remains limited. We analyze data from 165 regions across 19 EU member states over the period 2010 to 2021 to assess the relationship between corruption in public healthcare systems and the quality of public healthcare services. The analysis capitalizes on substantial variation in both corruption levels and healthcare quality indicators across regions. Our findings indicate that corruption in public healthcare provision may reduce public healthcare quality.

These results highlight the need for policymakers to prioritize anti-corruption measures within the health sector as a key element of public healthcare policy, particularly in regions most affected by corruption. The range of potentially effective policy responses include strengthening the independence of the judicial system, introducing anti-bribery legislation following best practices, promoting press-freedom and investigative journalism, the introduction or strengthening of anti-corruption agencies including specific ones for the health sector, increasing transparency in waiting lists, public procurement and the relationships between public healthcare professionals and the health industry, requiring medical professionals to prescribe generic rather than brand drugs, and introducing hotlines for reporting corruption [20,21,43,44].

Funding

Both authors have received funding from the Instituto de Estudios Fiscales (Ministerio de Hacienda, Spain) and project PID2022-136482OB-I00 of the Ministerio de Ciencia, Innovación y Universidades (Spain). A. Kyriacou has also received funding from projects PID2020-113452RB-I00 and PID2023-149660NB-I00/MICIU/AEI/10.13039/501100011033/FEDER/UE from the same institution.

CRediT authorship contribution statement

Andreas P. Kyriacou: Writing – review & editing, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Oriol Roca-Sagalés:** Writing – review & editing, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no competing interests.

Acknowledgements

We thank Nicholas Charron and Victor Lapuente for generously sharing their regional-level panel data on perceived quality and corruption in public healthcare, public education and law enforcement by the police. Open Access funding provided thanks to the CRUE-CSIC agreement with Elsevier.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.healthpol.2026.105693.

References

[1] Bruckner T. The ignored pandemic: how corruption in healthcare service delivery threatens universal health coverage. Transparency International; 2019.
[2] Transparency International. Global corruption report. London, Ann Arbor: Pluto Press; 2006.
[3] Garcia P. Corruption in global health: the open secret. Lancet 2019;394:2119–24.
[4] Savedoff WD, Hussmann K, Transparency International. Why are health systems prone to corruption?. Global corruption report. London, Ann Arbor: Pluto Press; 2006. p. 4–16.
[5] Azfar O, Gurgur T. Does corruption affect health outcomes in the Philippines? Econ Gov 2008;9:197–244.
[6] Vian T. Review of corruption in the health sector: theory, methods and interventions. Health Policy Plan 2008;23:83–94.
[7] Factor R, Kang M. Corruption and population health outcomes: an analysis of data from 133 countries using structural equation modeling. Int J Public Health 2015;60:633–41.
[8] Gupta S, Davoodi H, Tiongson E. Corruption and the provision of health care and education services. In: Abed GT, Gupta S, editors. Governance, corruption, and economic performance. Washington, DC: International Monetary Fund; 2002. p. 245–72.
[9] Hanf M, Van-Melle A, Fraisse F, Roger A, Carme B, et al. Corruption kills: estimating the global impact of corruption on children deaths. PLoS One 2011;6(11):e26990.
[10] Li Q, An L, Xu J, Baliamoune-Lutz M. Corruption costs lives: evidence from a cross-country study. Eur J Health Econ 2018;19(1):153–65.
[11] Lio MC, Lee MH. Corruption costs lives: a cross-country study using an IV approach. Int J Health Plan Manag 2016;31(2):175–90.
[12] Achim MV, Väidean VL, Borlea SN. Corruption and health outcomes within an economic and cultural framework. Eur J Health Econ 2020;21(2):195–207.
[13] Olafsdottir A, Reidpath D, Pokhrel S, Allotey P. Health systems performance in sub-Saharan Africa: governance, outcome and equity. BMC Public Health 2011;11:237.

[14] Witvliet M, Kunst A, Arah O, Stronks K. Sick regimes and sick people: a multilevel investigation of the population health consequences of perceived national corruption. Trop Med Int Health 2013;18(10):1240–7.
[15] Batniji R, Khatib L, Cammett M, Sweet J, Basu S, Jamal A, Wise P, Giacaman R. Governance and health in the Arab world. Lancet 2014;383:343–55.
[16] Habibov N. Effect of corruption on healthcare satisfaction in post-soviet nations: a cross-country instrumental variable analysis of twelve countries. Soc Sci Med 2016; 152:119–24.
[17] Cavalieri M, Guccio C, Rizzo I. On the role of environmental corruption in healthcare infrastructures: an empirical assessment for Italy using DEA with truncated regression approach. Health Policy 2017;121(5):515–24.
[18] Dincer O, Teoman O. Does corruption kill? Evidence from half a century infant mortality data. Soc Sci Med 2019;232:332–9.
[19] Rönnerstrand B, Lapuente V. Corruption and use of antibiotics in regions of Europe. Health Policy 2017;121(3):250–6.
[20] European Commission. Study on corruption in the healthcare sector. Directorate-general for migration and home affairs. Brussels: Publication Office; 2013.
[21] European Commission. Updated study on corruption in the healthcare sector. Directorate-general for migration and home affairs. Brussels: Publication Office; 2017.
[22] Charron N, Lapuente V, Bauhr M. Sub-national quality of government in EU member states: presenting the 2021 European quality of government index and its relationship with Covid-19 indicators. University of Gothenburg; 2021. p. 4. The QoG Working Paper Series 2021.
[23] Charron N, Lapuente V, Bauhr M. The geography of quality of government in Europe. University of Gothenburg, Department of Political Science, The Quality of Government Institute; 2024. Working paper series 2024:2.
[24] Rothstein B, Teorell J. What is quality of government? A theory of impartial government institutions. Governance 2008;21:165–90.
[25] Weber M. Economy and society: an outline of interpretive sociology. U. California Press; 1922/1978.
[26] Kyriacou A, Roca-Sagalés O. Local decentralization and the quality of public services in Europe. Soc Indic Res 2019;145:755–76.
[27] Kyriacou A, Roca Sagalés O. Fiscal decentralization and health care access and quality: Evidence from local governments around the world. Publius: J Fed 2024; 54(2):313–38.
[28] Kyriacou A, Roca-Sagalés O. Fiscal decentralization and governance quality: a review of the literature and additional evidence. In: Lago I, editor. Handbook on decentralization, devolution and the state. Edward Elgar Publishing; 2021. p. 322–46. Chapter 18.
[29] Hooghe L, Marks G, Schakel AH, Chapman S, Niedzwiecki S, Shair-Rosenfield S. Measuring regional authority. A postfunctionalist theory of governance, I. Oxford: Oxford University Press; 2016.
[30] Filmer D, Pritchett L. The impact of public spending on health: does money matter? Soc Sci Med 1999;49(10):1309–23.
[31] Pritchett L, Summers L. Wealthier is healthier. J Hum Resour 1996;31(4):841–68.
[32] Treisman D. What have we learned about the causes of corruption from ten years of cross-national empirical research? Annu Rev Polit Sci 2007;10:211–44.
[33] Watson D, McGrail K. More doctors or better care? Healthc Policy 2009;5(1): 26–31.
[34] Staiger D, Stock J. Instrumental variables regression with weak instruments. Econometrica 1997;65:557–86.
[35] Dipierro A, Rella A. What lies behind perceptions of corruption? A cultural approach. Soc Indic Res 2024;172:371–91.
[36] Rizzica L, Tonello M. Persuadable perceptions: the effect of media content on beliefs about corruption. Econ Policy 2020;35(104):679–737.
[37] Olken B. Corruption perceptions vs. corruption reality. J Public Econ 2009;93 (7–8):950–64.
[38] Fisman R, Golden M. Corruption. What everyone needs to know. Oxford University Press; 2017.
[39] Charron N. Do corruption measures have a perception problem? Assessing the relationship between experiences and perceptions of corruption among citizens and experts. Eur Polit Sci Rev 2016;8(1):147–71.
[40] Hofstede G. Culture's consequences. Sage; 1980.
[41] Roland G. Understanding institutional change: fast-moving and slow-moving institutions. Stud Comp Int Dev 2004;38(4):109–31.
[42] Welzel C. Freedom rising. Human empowerment and the quest for emancipation. Cambridge University Press; 2013.
[43] Vian T. Anti-corruption, transparency and accountability in health: concepts, frameworks, and approaches. Glob Health Action 2020;13(sup1):1694744.
[44] Gaitonde R, Oxman AD, Okebukola PO, Rada G. Interventions to reduce corruption in the health sector. Cochrane Database Syst Rev 2016;8:CD008856.

Further reading

[45] Klomp J, de Hann J. Effects of governance on health: a cross-national analysis of 101 countries. Kyklos 2008;61(4):599–614.