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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии
საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებშიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman (Кириллица)**, для текста на грузинском языке следует использовать **AcadNusx**. Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - <http://www.spinesurgery.ru/files/publish.pdf> и http://www.nlm.nih.gov/bsd/uniform_requirements.html В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректур авторам не высылаются, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or computer-printed on a single side of standard typing paper, with the left margin of 3 centimeters width, and 1.5 spacing between the lines, typeface - **Times New Roman (Cyrillic)**, print size - 12 (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf

In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

**Articles that Fail to Meet the Aforementioned
Requirements are not Assigned to be Reviewed.**

ავტორთა საქურაღებოლ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დაიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx**. შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრაფიების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალებების შედეგების ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფხიხლებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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CENTRALIZATION AND CORRUPTION IN HEALTH PROCUREMENT OF THE SOUTHERN EUROPEAN UNION COUNTRIES

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Abstract.

Aim: Healthcare procurement management in public hospitals has been a major concern for the countries of the Southern Europe, both due to their perennial problems in the field of corruption and the impact of increasing migration flows on the Mediterranean routes to the European Union. This study attempts to analyze the healthcare procurement systems of the Southern EU countries (EU MED or MED-9) based on the degree of centralization and perceived corruption and examine the applied procurement policies and their results in terms of efficiency, transparency, and competition. The MED-9 group consists of Cyprus, Croatia, France, Greece, Italy, Malta, Portugal, Slovenia, and Spain.

Methods: The study employed an analytical research design and was conducted in two phases. In the first phase, data regarding the model of health system and the type of healthcare procurement of MED-9 countries based on the degree of centralization were collected using a comprehensive documentation review. In the second phase, seven different corruption perception indices in the public procurement and healthcare sector were collected, recorded, processed and compared to validate findings from the first phase and gain additional insights and feed-back regarding the relationship between centralized procurement and corruption.

Results: The study revealed significant differences in the healthcare procurement systems among the MED-9 countries, confirming that they vary due to their different organizational structure and socioeconomic choices. Our findings showed that there is a relationship between the degree of centralization and perceived corruption. Although Southern EU countries display relatively high levels of general corruption, some of them have significantly lower levels of perceived corruption in the specific areas of the healthcare system and public procurement.

Conclusion: The study concludes that corruption is likely to decrease when purchasing processes are centralized. Healthcare procurement centralization through a central purchasing body can be an effective and powerful tool for cost reduction and fighting corruption in the public health sector.

Key words. Public procurement, healthcare sector, hospital supplies, centralization, corruption, Southern European Union.

Introduction.

The Euro-Mediterranean group EU-MED or MED-9 was established in 2016 to strengthen cooperation between the

Southern countries of the European Union [1]. The MED-9 Group, as shown in Figure 1, consists of Cyprus, Croatia, France, Greece, Italy, Malta, Portugal, Slovenia, and Spain [2]. The total population of the MED-9 countries represents approximately 45 percent of the EU population [3]. According to the Declaration of the 8th Southern EU Summit, which took place in Athens on 17 September 2021 during the COVID-19 health crisis, the aim of the MED-9 countries is to overcome the weaknesses of health systems, such as ensuring access to medicines in all Member States and their effective or even timely preparation, against future crises [4].



Figure 1. Map of MED-9 countries.

However, the healthcare systems worldwide are confronted with the constantly growing cost of medical care, the limitation of available resources and the failure to meet the legitimate and reasonable expectations of patients-users for high quality care. The situation is even more difficult in the countries of the European Mediterranean, as their health systems are under pressure due to the increase in flows of migrants and refugees [5]. It is noted that in the period between January and August, in 2023 there was an increase in crossings on the Central Mediterranean (+97%, 114,900) and the Western Mediterranean routes (+7%, 20,200) compared to the same period in 2022 [6].

Nowadays, the users of health services, regardless of whether they are migrants, refugees, or permanent residents of host countries, seek equal access to increasingly better-quality healthcare and expect the use of medical equipment and

modern medical diagnostic tools to them that incorporate the latest technology [7]. Implementing the equal access obligation [8] and ensuring the provision of high-quality public health services requires a strategic approach to sourcing, which depends to a large extent on modern and efficient public procurement procedures [9].

The discussion regarding the public health services and procurement is directly related to the organization and funding of health systems. The health systems of EU countries depending on their service delivery, financing, and economic policies, are categorized into those where funding comes from the state budget based on general taxation (often referred to as the “Beveridge” model or National Health Service) and those where funding comes from the compulsory social insurance (often referred to as the “Bismarck” model or Social Health Insurance) [10]. Between these two classic models of organization and funding, there is also an intermediate form with private finance based on voluntary insurance, often referred to as the “Mixed” model health system [11,12].

The management of healthcare supplies in public hospitals has been a serious concern for the Southern EU countries, mainly due to their perennial problems in the field of corruption [13]. Their initiatives include centralized or decentralized supplies, the enhancement of information systems for monitoring and updating data and the improvement of infrastructures and processes along the supply chain. However, it is a fact that healthcare procurement systems constitute complex decision-making mechanisms involving suppliers with monopolistic behavior, public healthcare providers with limited financial resources, unfair and opaque competitive conditions, as well as corrupt public officials and political actors [14]. The relationship between centralization of procurement and perceived corruption in the healthcare sector is an important element in the recent debate on the policy design of a procurement system.

Due to this complexity, the first important decision to be taken when designing a procurement system, concerns the degree of centralization [15], namely to what extent the decision-making power on the healthcare procurement (what, how and when) will be transferred either to a central public authority established for this purpose, or to the competent local authorities [16]. The healthcare procurement systems based on the degree of centralization are categorised into three types: Centralized, Decentralized and Hybrid procurement systems [17]. A procurement system is fully centralized when all relevant decisions (what, how and when) on the purchasing of products, whether through tendering procedures or negotiations, are taken by a central purchasing body set up for this purpose. Fully decentralized is the procurement system in which the power of decision making on the purchasing of products (what, how and when) has been transferred to the relevant local administrations. Between the decentralized and centralized procurement system, there is also an intermediate system, the hybrid system, in which the central authority and the competent local administrations share decision-making power [18].

The degree of centralization of the healthcare procurement system is integrated in the wider context of procurement, an issue that has been widely explored, although not very extensively in public procurement [19]. The debate of centralization

versus decentralization of procurement, due to both the cost containment and fight against corruption, attracts the interest of researchers, professionals, and public officials from various points of view and as a result it is becoming ever more important for many organisations [20]. According to the above rationale and the practical orientation of this study, pursuing a pragmatic approach in the field of health procurement in Mediterranean Europe, the objectives of this study are as follows:

- To analyze the healthcare procurement system of the Southern EU countries and categorise it through the degree of centralization.
- To ascertain whether or not a central purchasing body has been established.
- To investigate the healthcare system model in which the hospital supplies of each country are executed and its respective degree of centralization.
- To examine the relationship between centralized procurement and corruption in the healthcare sector of the Southern EU countries.

Methods.

This study approaches the issue of health procurement in the Southern EU countries in the light of degree of centralization and attempts to analyze their procurement systems in terms of perceived corruption, in order to draw useful conclusions about their similarities and differences, their efficiency and effectiveness and the best practices for cost containment and fight against corruption.

The study employed an analytical research design and was conducted in two phases. In the first phase, data regarding the model of health system and the type of healthcare procurement based on the degree of centralization were collected using a comprehensive documentation review. In the second phase, seven different corruption perception indices in the public procurement and healthcare sector were collected, recorded, processed, and compared to validate findings from the first phase and gain additional insights and feedback regarding the relationship between centralized procurement and corruption.

Research question (RQ).

Which type of health procurement do the nine Southern EU countries apply based on the degree of centralization and what are its impact on perceived corruption on the healthcare system and public procurement?

Data collection and analysis.

The data collection process for this study employed a mix of document review and corruption perception indices.

Inclusion criteria.

All included articles were searched and retrieved online. Quantitative, qualitative, and mixed methods studies were included. In addition to the academic literature sources, press articles, conference summaries, legislation and jurisprudence were included. For the determination of criteria for analysing health procurement systems, countries were selected that: (a) Geographically belong to the European Mediterranean region, (b) They are Member States (M-S) of the EU. More precisely, the countries that satisfy the above criteria, were the following:

Croatia, Cyprus, France, Greece, Italy, Malta, Portugal, Slovenia, Spain. These countries form the Euro-Mediterranean group EU-MED (or MED-9). The data search was initially conducted in English, but subsequently there was no language restriction once the documents in other languages had versions in English. The literature search was not restricted by timeline.

Exclusion criteria.

Poor quality studies were excluded. As both qualitative and quantitative studies were included in the present study, critical appraisal of the included studies was conducted based on the Mixed Methods Appraisal Tool (MMAT) [21]. Studies which contained information that did not contribute to answering the research question were excluded. Documents with incomplete texts (abstracts or inaccessible full texts) were excluded.

Search strategy.

For the first phase of the study, the methodology followed is the theoretical literature research of key electronic databases (Scopus, PubMed—MEDLINE) and search engines (Google Scholar) for peer-reviewed publications. It also includes literature search for institutional and legislative texts from the EU law database EUR-Lex and official websites of national authorities, European institutes, and international organizations in combination with the research of perceived corruption in the healthcare systems and public procurement of MED-9 countries. Search terms that were used to find relevant and appropriate source are shown in Table 1. A screening of the literature was performed, and the most representative articles, evaluated by title, abstract, and full text, were selected based on the authors' experience.

Table 1. Set of search terms.

Search words
“centralized” OR “decentralized” OR “hybrid” OR “degree of centralization”
AND
“procurement” OR “hospital supplies” OR “medical goods” OR “purchasing” OR “management” OR “organization”
AND
“healthcare” OR “health sector” OR “health system” OR “public health”
AND
“corruption” OR “perceived corruption” OR “anti-corruption” OR “public tenders” OR “transparency” OR “cost containment”
“European Union” OR “EU Med” OR “Med-9” OR “Southern EU countries”
AND
“Cyprus” OR “Croatia” OR “France” OR “Greece” OR “Italy” OR “Malta” OR “Portugal” OR “Slovenia” OR “Spain”

The qualitative data for analysing health procurement systems comes from the Euro-Mediterranean group EU MED (or MED-9) which consists of Cyprus, Croatia, France, Greece, Italy, Malta, Portugal, Slovenia, and Spain.

For categorising the type of procurement system (centralized, decentralized, hybrid), elements are included concerning:

- The degree of centralization of healthcare procurement
- The change tendency of the centralization degree

- The establishment or not of one or more central purchasing bodies.

For investigating the health system in which the hospital supplies of each country are executed, elements are included concerning:

- The model of the health system (Beveridge, Bismarck, Mixed).
- The centralization degree of the health system.
- The change tendency of the centralization degree.

In the second phase of the study, the quantitative data for exploring the levels of corruption perceived and experienced by European citizens and businesses comes from:

- The Transparency International Corruptions Perception Index 2022
- The Special Eurobarometer 523 survey (2022) results in the areas of spread of corruption, corruption in the healthcare system and corruption of officials awarding public tenders.
- The Flash Eurobarometer 507 survey (2022) results in the areas of corruption in public procurement, corruption in public procurement managed by national authorities and corruption in public procurement managed by regional or local authorities.

Data analysis.

The data generated from the documentation review (see Tables 2 and 3) and the corruption perception indices (see Tables 4-8) is entered into form so that it can be analyzed, processed, and compared with each other. The concise and effective presentation of the data is carried out by the method of descriptive statistical analysis. The presentation of the results concerning the models of health system, the types of health procurement as well as corruption indices is depicted in a table per country and sector or alternatively in a graph-map (see Figure 2) to provide a direct assessment of the existence or non-existence of heterogeneity. The values of corruption indices and results are compared to explore which country achieves the lowest and the highest corruption rates in each area. Then, depending on the type of the healthcare procurement system, the establishment of one or more central purchasing bodies, the model of the health system and its degree of centralization, it is concluded which is the most efficient and effective combination of all the above variables.

Table 2. Models of health system in MED-9 countries.

MED-9 Country	Model	Degree of Centralization	Change Tendency
Croatia	Mixed	Centralized	
Cyprus	Beveridge	Centralized	
France	Mixed	Centralized	Deconcentrated
Greece	Mixed	Centralized	
Italy	Beveridge	Decentralized	Decentralized
Malta	Beveridge	Centralized	Decentralized
Portugal	Mixed	Centralized	
Slovenia	Bismarck	Centralized	
Spain	Beveridge	Decentralized	

Results.

The results obtained by the analysis of the health systems of the nine Southern EU countries, regarding the model of health

Table 3. Types of healthcare procurement in MED-9 countries.

MED-9 Country	Type	Change Tendency	Centralized Purchasing
Croatia	Hybrid		Yes, Central Procurement Office (CPO)
Cyprus	Centralized		Yes, Purchasing and Supply Directorate (PSD)
France	Decentralized	Centralized	Yes, French Hospital Purchasing Group (Resah)
Greece	Hybrid		Yes, National Centralised Health Procurement Authority (NCHPA)
Italy	Hybrid		Yes, Concessionaria Servizi Informativi Pubblici (Consip)
Malta	Centralized		Yes, Central Procurement and Supplies Unit (CPSU)
Portugal	Centralized		Yes, Servicos Partilhados do Ministerio de Saude (SPMS)
Slovenia	Centralized		No
Spain	Centralized		Yes, multiple

Source: Developed by authors based on the data of the EU's Country profiles (HiT series) of the European Observatory on Health Systems and Policies and the Public procurement – Study on administrative capacity in the EU[26].

Table 4. EU Corruption Perceptions Index-CPI 2022.

Country	CPI 2022	Country	CPI 2022	Country	CPI 2022
Denmark	90	Belgium	73	Poland	55
Finland	87	France*	71	Slovakia	53
Sweden	83	Portugal*	62	Greece*	52
Netherlands	80	Lithuania	62	Cyprus*	52
Germany	79	Spain*	60	Malta*	51
Ireland	77	Latvia	59	Croatia*	50
Luxembourg	77	Italy*	56	Romania	46
Austria	74	Slovenia*	56	Hungary	42
Estonia	74	Czechia	56	Bulgaria	42

* MED-9 Country

Source: Developed by authors based on the Corruption Perceptions Index 2022 (CPI 2022) of Transparency International.

Table 5. Percentage estimated corruption to be widespread in the country.

Country	Percentage	Country	Percentage	Country	Percentage
Greece*	98	Slovakia	83	Belgium	56
Croatia*	94	Lithuania	81	Poland	55
Cyprus*	94	Malta*	79	Germany	53
Hungary	91	Czechia	78	Netherlands	50
Portugal*	90	Latvia	78	Estonia	43
Italy*	89	Romania	72	Luxembourg	36
Spain*	89	France*	64	Sweden	32
Bulgaria	88	Ireland	59	Finland	17
Slovenia*	87	Austria	57	Denmark	16
EU	68	* MED-9 Country			

Source: Developed by authors based on the data of the Special Eurobarometer 523 “Attitudes towards corruption in the EU” March-April 2022.

Table 6. Percentage estimated corruption in the healthcare system.’

Country	Percentage	Country	Percentage	Country	Percentage
Greece*	91	Poland	41	Netherlands	19
Lithuania	69	Latvia	40	Malta*	17
Cyprus*	60	Italy*	39	Estonia	14
Slovakia	58	Czechia	38	Ireland	13
Bulgaria	51	Portugal*	30	Belgium	13
Romania	50	Germany	21	Luxembourg	11
Slovenia*	48	Austria	21	Sweden	8
Hungary	46	France*	20	Denmark	7
Croatia*	45	Spain*	20	Finland	5
EU	29	* MED-9 Country			

Source: Developed by authors based on the data of the Special Eurobarometer 523 “Attitudes towards corruption in the EU” March-April 2022.

Table 7. Percentage estimated corruption of the officials awarding tenders.

Country	Percentage	Country	Percentage	Country	Percentage
Greece*	63	Poland	31	Netherlands	61
Lithuania	56	Latvia	55	Malta*	45
Cyprus*	58	Italy*	58	Estonia	31
Slovakia	50	Czechia	68	Ireland	32
Bulgaria	60	Portugal*	48	Belgium	46
Romania	36	Germany	39	Luxembourg	25
Slovenia*	59	Austria	35	Sweden	43
Hungary	50	France*	42	Denmark	19
Croatia*	57	Spain*	46	Finland	29
EU	45	* MED-9 Country			

Source: Developed by authors based on the data of the Special Eurobarometer 523 “Attitudes towards corruption in the EU” March-April 2022.

Table 8. Percentage estimated corruption in the public procurement. [General (G)/National (N)/Local (L)]

Country	Percentage			Country	Percentage			Country	Percentage		
	G	N	L		G	N	L		G	N	L
Cyprus*	52	72	77	Hungary	31	69	72	Luxembourg	24	27	27
Bulgaria	49	69	70	Poland	31	59	60	Portugal*	21	79	77
Greece*	47	71	78	Latvia	31	54	52	Austria	21	36	38
Slovakia	43	63	61	Italy*	31	47	38	Finland	20	24	27
France*	38	43	51	Croatia*	30	80	77	Netherlands	19	27	36
Belgium	37	47	53	Malta*	28	54	48	Estonia	17	25	33
Romania	36	67	67	Lithuania	27	47	54	Germany	13	27	37
Czechia	36	63	56	Slovenia*	26	67	65	Denmark	13	19	19
Spain*	35	69	73	Sweden	26	27	36	Ireland	7	22	24
EU	30	27	53	* MED-9 Country							

Source: Developed by authors based on the data of the Flash Eurobarometer 507, “Businesses and corruption”, April 2022.

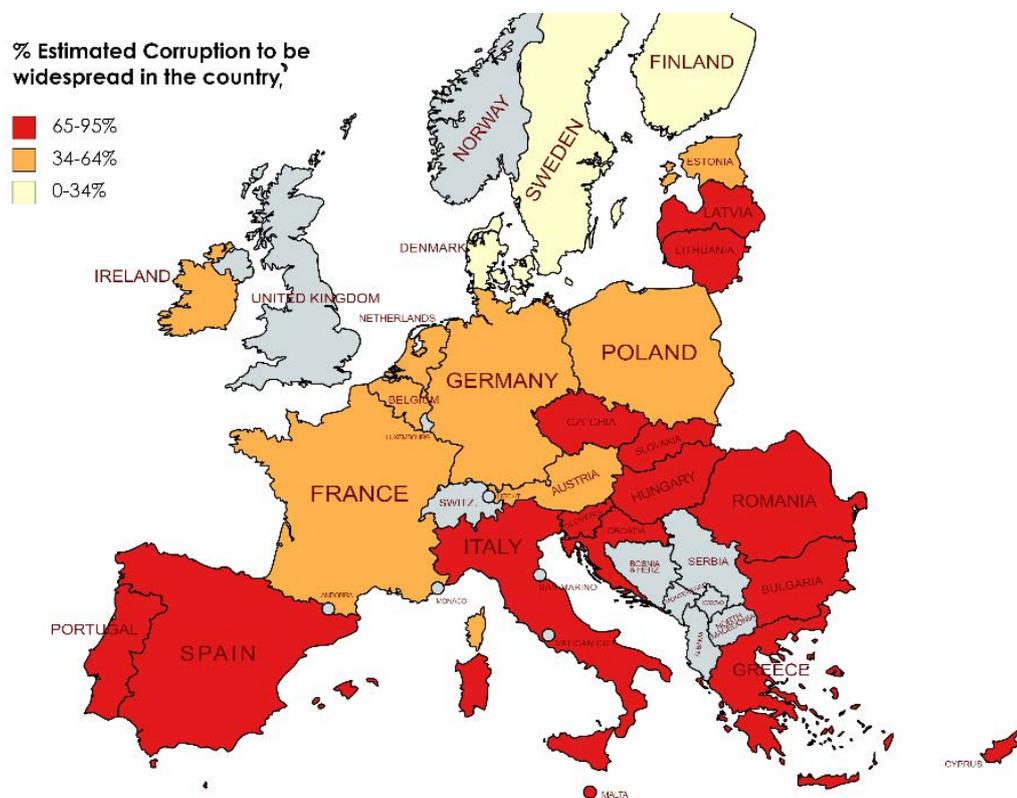


Figure 2. Levels of perceived corruption in the EU.

Source: Developed by authors based on the data of the Special Eurobarometer 523 “Attitudes towards corruption in the EU” March-April 2022.

system (see Table 2), the type of healthcare procurement based on the degree of centralization (see Table 3) and the corruption perception indices (see Table 4-8), are the following:

Croatia.

Croatia implements a mixed health system as it is based on a compulsory social health insurance system integrated with public funding within a single entity, the Croatian Health Insurance Fund (HZZO) [22]. It also offers the possibility of supplementary voluntary insurance to cover supplementary payments to the compulsory health insurance system. The Croatian health system is classified as centralized, as the Ministry of Health has the responsibility of the management and is the main regulatory body, responsible for the development, design and evaluation of health policy, public health programs, regulatory standards, and the training of health professionals [23].

The Croatian healthcare procurement system, until the early 2000s, was quite decentralized, as all hospitals procured medical products individually and through public tenders. This practice resulted in large price differentials for the same or similar products of the same manufacturer [24]. Subsequently, in order to address the various financial and structural problems of the system (imbalance between revenue and expenditure, over-infrastructure, and poor performance), some reform efforts were made, culminating in the so-called “2008 reform” [25]. The reform included, inter alia, the centralized procurement of medical equipment (such as CT, MRI, and linear accelerators).

After 2012, the Croatian government for the elimination of the substantial price differentials, introduced a joint procurement for the state-owned hospitals, but taking a decentralized approach. Specifically, nine state-owned hospitals and HZZO delegated as central procurement authorities, and each was assigned a range of products to purchase for all participating hospitals. Hospitals that historically managed to achieve the best price for a particular product category assumed the role of central buyer/coordinator for these products. The estimated cost savings from joint tenders completed by February 2014 were €59 million or about 27 percent, compared to prices paid before the introduction of joint procurement [13].

In conclusion, and based on what we have already mentioned on the three types of health procurement systems we could classify the Croatian health procurement system as a hybrid system, since each of the above nine hospitals is authorized to act as contracting authority (central buyer/coordinator) on behalf of several contracting authorities (other hospitals) by concluding agreements for the supply of specific products that historically achieved the best price.

Corruption in Croatia is still high, especially at the local level and despite repeated reforms. The political influence still plays a significant role in the procurement system [26]. According to the 2022 Corruption Perceptions Index (CPI) reported by Transparency International, Croatia scored 50/100 and is the 24 least corrupt nation out of 26 in the EU and the 57 out of 180 countries in the world [27]. Croatia has the 2nd highest rate of general corruption within the EU [28], according to the Eurobarometer, while perceived corruption in public procurement is at the same level as the EU average [29].

Cyprus.

The health system of Cyprus, due to being a British colony until 1960 [30], has its roots in the Beveridge model [31]. It is a highly centralized system, strictly controlled by the Ministry of Health. The Ministry of Health is responsible for the organisation, administration and planning of the healthcare services provided [32].

The purchase and supply of medical products, appliances and equipment to the Cyprian public hospitals is centralized through a single procurement body, the Purchasing and Supply Directorate of the Ministry of Health and in accordance with the law governing the public procurement procedure. The centralized procurement aims to strengthen bargaining power between suppliers and buyers, to ensure lower prices by achieving economies of scale, to make more effective use of public money as well as to enhance the control and avoid the risk of fraud. The Purchasing and Supply Directorate established a Mechanism for the selection, determination, and prioritization of needs, by setting up prioritisation of Needs Committees at every hospital, such as a Central Committee for Prioritisation and Approval of needs, at the Ministry level [33]. The tenders announced by the Purchasing and Supply Directorate are registered on the relevant electronic platform of the Treasury [34].

According to Eurobarometer, Cyprus has the highest level of perceived corruption in public procurement within the EU [29] and the third highest level of perceived corruption in the healthcare system. The level of corruption in general and in specific areas such as the officials who award public tenders are also high [28]. According to CPI 2022, Cyprus scored 52/100 and it is the 22 least corrupt nation out of 26 in the EU and the 51 out of 180 countries in the world [35].

France.

The French health system is a mixed model, structurally based on the Bismarck model but with the goals of universality and solidarity found in Beveridge model reflected on: (a) the single-payer model, (b) the current growing importance of tax-based revenues for healthcare financing, and (c) strong government intervention [36]. With regard to the degree of centralization, although all reforms were aimed at the decentralization of the system, the underlying idea correspondingly reflects a strong reluctance to reduce central control over politics and finance [37]. Therefore, the decentralization of the French healthcare system mainly takes the form of deconcentration, namely the transfer of power to local or lower-level authorities which are accountable to central government [38].

The French health procurement system is a part of the overall public procurement system, characterised by its complex administrative and political structure, with many levels of procurement and supervision. Despite the central set of legal rules governing procurement, it is up to the local authorities to take responsibility for such action, posing a major obstacle to standardisation. Over the past five years, the French government has embarked on an ambitious digital transformation programme in the health sector with the creation of the Organisation L' Agence Française de la Santé (ASIP Santé). However, fragmented procurement and data localisation

requirements remain significant barriers to the uptake of digitalised procurement services [39]. The French health system has a public central purchasing body, Resah, which was created in 2007 and operates on behalf of 150 hospitals and nursing homes, covering all hospital needs both in medical products (medicines, devices, biomedical equipment) and non-medical (in-formation systems, communications, catering, energy). The volume of procurement through Resah contracts reached for 2022 the amount of 2 billion euros [40].

France has a relatively high-level corruption in public procurement, especially in those managed by national and local authorities. The Central Service for the Prevention of Corruption (SCPC), which collects and provides data on corruption, has repeatedly identified risks of corruption in public procurement procedures, especially those carried out at local level [26]. The above risks are also confirmed by the relevant Eurobarometer survey, since France has the 5th highest level of perceived corruption in public procurement within the EU [29]. Levels of perceived corruption are also moderate to high, but much lower in terms of specific corruption in officials awarding public tenders and in the healthcare system [28]. According to CPI 2022, France scored 71/100 placing it in the 10 least corrupt nation out of 26 in the EU and the 21 out of 180 countries in the world [41].

Greece.

The health system of Greece is a mixed model as it comprises elements from both the public and private sectors. Specifically, in the public sector, there is a system of National Health Services (NHS), called the National Health System (ESY), along with a single social health insurance (SHI) provider called EFKA. It is a highly centralized health system since the Ministry of Health is responsible for planning and regulating the NHS, and the National Organisation for the Provision of Health Services (EOPYY), which is the manager of the single health insurance fund and the purchaser of publicly funded health services [42].

The healthcare procurement system of Greece has the characteristics of a hybrid system, since purchases of medical pharmaceutical products are made both through the National Centralized Health Procurement Authority (NCHPA) [43] in its capacity as National Central Purchasing Authority and through the seven Health Regions authorities (YPEs) which have been designated as Central Purchasing Authorities [44]. NCHPA is supervised by the Ministry of Health and its purpose is to ensure the implementation of central procurement in the field of health [45]. Particularly encouraging for the results of the NCHPA's first year in operation was the first report of the European Commission following Greece's exit the European Union's enhanced surveillance framework in August 2022. Specifically, the Authority launched tenders for central purchasing of goods amounting to the agreed percentage of 40 percent of the hospitals' budget and corresponding to the total value of € 300 million [46].

The Greek authorities have repeatedly identified corruption as a major issue affecting public administration and in particular the procurement process. For this reason, Greece in recent years, and especially during the period of economic crisis, has undertaken numerous reforms to increase transparency and fight

corruption [26]. The reforms had a positive effect, reflected in CPI 2022, according to which Greece scored 52/100 and ranked 21st least corruption country in the EU and 51st worldwide, a remarkable improvement from 94th in 2012 [47]. Despite the improvement in the corruption indices, the levels of both perceived corruption in general and in the specific area of healthcare system are the highest within the EU [28]. The high levels of perceived corruption also exist in the specific area of public procurement where Greece ranks third worst in the EU [29].

Italy.

The Italian health system follows the Beveridge model of the National Health Systems (NHS), with the particularity that it is regionally organised and financed mainly by national and regional taxes, supplemented by private payments for pharmaceutical products and outpatient care. In terms of centralization, since the early 2000s, the Italian healthcare system has undergone a process of fiscal decentralization from central government to regions. It is therefore, a decentralized and regional national health system, organised at three levels: national, regional, and local [48]. At the lowest level, the ASLs (Aziende Sanitarie Locali), are in charge of providing primary medical and secondary services for each regional area.

The Italian Government is the main buyer of medical equipment as public hospitals account for more than 75% of medical device purchase throughout the country. At the national level, Consip, owned by the Ministry of Economy and Finance, is responsible for procuring medical equipment, conducting the relevant tenders [49]. At regional level, healthcare supplies are organised through the health procurement agency set up for each region [50]. For example, this role in the Piemonte Region has been taken over by SCR Piemonte, which is the central health procurement body for more than 20 hospitals with an annual total purchase value of €620.9 million [51]. While certain individual ASLs independently handle public procurement in a de-centralized manner, some regions have implemented a centralized approach by assigning procurement responsibilities to a central body known as Centrale di Acquisto Regionale or Centrale di Committenza Regionale. In such cases, ASLs within the regional area are typically required to procure through this centralized unit. Alternatively, ASLs have the option to collaborate and appoint a representative to handle procurement for the entire group. This procurement strategy, which combines elements of both centralized and decentralized approaches could be considered as a hybrid model [17].

The Italian procurement system, in general, is prone to corruption and inefficiency, partly due to the lack of administrative capacity of the public administration and weaknesses in the legislative framework [26]. This is reflected in the relevant Eurobarometer survey according to which Italy has the 10th highest level of perceived corruption in public procurement within the EU [29]. Similarly, the levels of both general corruption and corruption in the healthcare system are relatively high [28]. According to CPI 2022, Italy scored 56/100 and ranks 16th least corrupt country in the EU and 41st worldwide [52]. However, a study regarding the impact of the Central Purchasing Bodies (CPB) in the Italian health care system demonstrated that the introduction

of centralized procurement in Italy's regional healthcare systems reduced per capita health spending by about 2-8 percent, without affecting the level of health-related public services. Furthermore, the reduction in public expenditure was effective only in areas characterized by poor quality of institutions. This demonstrates that pooling supplies can be an effective tool to reduce the impact of corruption in the health sector [53].

Malta.

The Maltese health system is based on the Beveridge model [54] as the Malta's National Health Service (NHS) is funded primarily through general taxation and provides almost universal coverage to all Maltese residents [55]. Given that Malta is the smallest EU country in both population and size, this allows for the operation of a relatively centralized government system, including the management of the healthcare system [26]. However, there have been some legislative initiatives with a decentralized approach, such as the Health Law of 2013, which in paragraph 6 provides guidance to the Directorate of Health Services to establish a framework of controlled decentralization and autonomy [56].

The Maltese healthcare procurement system is centralized as all decisions on resource allocation and procurement are usually taken centrally at Ministry level [26]. Specifically, the Central Procurement and Supplies Unit (CPSU) is responsible for managing healthcare procurement with the aim of acquiring quality materials at the lowest price, ensuring fulfilment of requirements, securing conditions of fair competition among suppliers, and solidifying the sense of trust that contracts are awarded with full transparency, fairness, and economic means [57].

Malta exhibits a relatively high level of general corruption, but significantly lower levels of corruption in specific areas such as the healthcare system, the officials awarding public tenders [28] and the public procurement which are close to the EU average [29]. According to CPI 2022, Malta scored 51/100 and ranks 23rd least corrupt country in the EU and 54th worldwide [58].

Portugal.

The health system of Portugal is a mixed model, based on interaction between the public and private sectors, as in the field of funding, which integrates primary, secondary, and long-term care. In this context of operation, the system consists of three coexisting and overlapping systems: (a) the NHS, (b) the health subsystems, which are specific public and private insurance schemes for certain professions or companies; and (c) the private Voluntary Health Insurance (VHI) [59]. The Portuguese health system is considered to be quite centralized, since the relevant law of 1979 establishing the NHS may have defined the principles of centralized control with simultaneous decentralized management, but the planning and regulatory activities of the system are concentrated in the Ministry of Health and its agencies [60].

Portugal implements a centralized healthcare procurement system, making centralized purchases (total value of purchases 2021: €1.6 billion) through the public undertaking SPMS-Serviços Partilhados do Ministério da Saúde [61]. SPMS was established in 2010 and operates under the supervision of the Ministries of Health and Finance [62]. Its aim is to provide

joint services to organisations specifically active in the health sector in order to "centralize, optimize and streamline" the supply of goods and services within the National Health Service (NHS) [63]. Some of the principles governing its operation are effectiveness, efficiency, simplification of administrative procedures, security, speed, and transparency [64]. However, a survey conducted by the Austrian National Institute of Public Health to evaluate centralized procurement of medicines in Portugal showed that carrying out centralized procurement procedures through SPMS, which include both open procedures (Aquisições centralizadas /AC) with one (or two) suppliers and two-stage procedures of framework agreements (Acordos Quadros /AQ), have many advantages but at the same time have some weaknesses. The advantages mainly concern achieving lower prices, compared to individual purchases in several (but not all) cases, and therefore saving resources for the public sector. They also contribute to improving transparency of procedures, governance, and equal access. On the other hand, it is observed a lack of strategy on centralized procurement, a low level of involvement of clinical expertise in procedures, absence of performance indicators, limited market knowledge by SPMS, ambiguity as regards its roles and responsibilities and a lack of institutional coordination between the key public institutions ACSS, INFARMED and SPMS. Finally, time-consuming, and bureaucratic procedures in centralized purchasing delay the completion of procedures, resulting in the unavailability of medical equipment and medicines, which forces hospitals to carry out direct supplies with parallel procedures [65].

According to Eurobarometer, Portugal has the 5th highest level of general corruption in the EU [28]. On the contrary, Portugal has the lowest perceived corruption in the specific area of public procurement of all Southern EU countries [29]. According to CPI 2022, Portugal scored 62/100 and ranks 13th least corrupt country in the EU and 33rd worldwide [66].

Slovenia.

Slovenia has a compulsory social health insurance (SHI) system with only one public insurer, the Health Insurance Institute of Slovenia-HIIS (ZZZS), which provides almost universal coverage of the population (about 99%) for a wide package of benefits [67]. The Slovenian health system is relatively centralized both at the level of service provision and at the level of management of compulsory health insurance [60].

Slovenia has also a relatively centralized public procurement system compared to neighboring EU Member States with centralized and joint procurement carried out by many different bodies depending on the subject of procurement. Demand aggregation is an issue that the Slovenian government has always focused on. Especially in the health sector, in recent years, the pooling of health supplies has been implemented as a pilot project. Even before 2003, the Ministry of Health and ZZZS had centralized the procurement process of medical equipment and devices in order to increase the transparency of public spending and reduce prices, thus allowing a fair geographical distribution of the goods procured [26]. Specifically, all public tenders for the supply of large medical technology devices, such as tomography scanners (MRI, CT, positron emission), are conducted by the Ministry of Health and published on its relevant website. The

ZZZS monitors health spending, negotiates prices and enters into contracts with suppliers of medical and pharmaceutical products.

Corruption remains a serious issue in Slovenia, especially in the area of procurement [26]. According to the Eurobarometer survey on perceived corruption among officials awarding public tenders, Slovenia has the 5th highest level of corruption in the EU [28]. Similarly, the levels of both general corruption and corruption in the healthcare system are relatively high [28] but slightly better than the EU average of perceived corruption in public procurement [29]. Slovenia scored 56/100 according to CPI 2022 and ranks 18th least corrupt country in the EU and 41st worldwide [68].

Spain.

The Spanish health system is based on the Beveridge model as the Sistema Nacional de Salud (SNS) is based on the principles of universality, free access, equality and justice and it is mainly funded through general taxation. It is a decentralized health system, organized into two levels, the national and the regional, reflecting the administrative division of the country into 17 regions [69]. The Spanish NHS, following a decision of the Interterritorial Council (CISNS) of 18 March 2010, agreed to promote the centralized market for medicines, health products and services as a measure to rationalization, coherence, and efficiency of the health system. From 2013 to 2022, 15 tenders have been held with a total value of 2.7 billion euros, resulting in savings of €237 million euros. The tenders concerned supplies of medicines, medical devices (e.g. gloves, gauze, bandages, glucose test strips, intraocular implants, hip, and shoulder prostheses) and in the near future, central markets for defibrillators and pacemakers, along with pharmaceutical products, are scheduled to begin. In the health procurement tenders that have taken place so far, 13 Autonomous Communities have participated [70]. Similar centralized health procurement initiatives in Spain have been taken individually and at regional level. For example, the Catalan Health and Social Care Consortium (Consorti CSC) is a regional public body that manages 45 hospitals in Catalonia, whose purchasing power is linked to each other through the consortium's central purchasing body [71].

According to Spain's National Public Procurement Observatory, many of the serious national corruption cases have been linked to procurement [26]. This conclusion is also confirmed by the relevant Eurobarometer survey, since Spain has the 9th highest level of perceived corruption in public procurement within the EU [29]. Similarly, the levels of general corruption are relatively high, in contrast to the level of corruption in the specific area of officials awarding public tenders and the healthcare system [28]. According to CPI 2022, Spain scored 60/100 and ranks 15th least corrupt country in the EU and 35th worldwide [72].

Discussion.

The results of our study revealed significant differences in the healthcare procurement systems among the MED-9 countries confirming that they vary due to their different organisational structure and socioeconomic choices [73]. Despite the differences

in both organisation and centralization, procurement systems are characterised by common fundamental principles of the EU, such as transparency, equal treatment, and non-discrimination. They are also distinguished by common objectives such as best value for money, higher efficiency, modernization of public sector services, reduction of administrative burdens, response to societal challenges and prevention of corruption [74].

Centralised procurement.

In particular and regarding the type of healthcare procurement, we found that the Southern EU countries which implement the “centralized” healthcare procurement system are Cyprus, Malta, Portugal, Slovenia, and Spain. It is emphasized that there is no tendency towards de-centralization, as well as the majority of the above countries (except Slovenia) have established central purchasing bodies. Centralized purchasing and competitive bidding have the potential to reduce healthcare costs by leveraging economies of scale and enhanced buying capabilities. Centralization also aids in minimizing exceptional purchases, which often arise when staff lack adequate training in professional purchasing methods. Additionally, the advantages extend beyond cost reductions and savings to encompass increased transparency and governance, leading to enhanced fairness and equity [75]. Centralized procurement is essential for preventing waste and inefficiency, as well as for establishing effective control systems [76].

Decentralized procurement.

On the other hand, the only Southern EU country that applies the “decentralized” healthcare procurement system is France. The main argument of the proponents of the idea of decentralized procurement is that smaller but well-structured entities possess greater adaptability and accountability compared to larger ones. Additionally, decentralization facilitates procurement management in proximity to end-user demands, thereby enhancing cost efficiency and fostering the development of the local small and medium-sized enterprises [77]. In recent years, however, France has also implemented policies of gradual centralization of its procurement in order to achieve economies of scale, save resources, increase transparency of public spending and fight corruption.

Hybrid procurement.

Finally, the Southern EU countries which implement the “hybrid” healthcare procurement system are Croatia, Greece, and Italy. A hybrid procurement approach provides greater flexibility than either a full centralized or decentralized procurement model. Moreover, it can enhance the efficiency of the healthcare system by incorporating decentralized functions. For instance, centralized procurement can contribute to cost reduction through consolidating purchasing power, while decentralized procurement can aid in cost reduction by empowering local departments to negotiate more favourable deals tailored to their specific needs. Moreover, the hybrid procurement system can support both national and regional initiatives, with the central government assuming a crucial role in procuring, storing, and distributing essential public health items [78].

Relationship between centralized procurement and corruption.

Many studies examined the impact of the structural organization of bureaucracy on official corruption and find that a centralized bureaucracy results in lower bribes than a decentralized one [79]. Several studies have shown that centralized and hybrid procurement systems perform better with respect to decentralized systems [17,53,80-82]. The centralized provision of public goods might be more efficient than their decentralized provision, but under very restrictive conditions [83]. Our study also revealed a relationship between centralized procurement and corruption in the healthcare sector of the Southern EU countries. As centralized agencies are subject to heightened oversight, they tend to favour transparent procedures and minimal interactions with local vendors. Consequently, this study posits that corruption is likely to decrease when purchasing processes are centralized [13]. Although Southern EU countries display relatively high levels of general corruption, as shown in Figure 2, some of them have significantly lower levels of perceived corruption in the specific areas of the healthcare system and public procurement.

Corruption in the health sector is not an isolated phenomenon. Perceived corruption in the specific area of healthcare is correlated with general levels of perceived corruption. Greece, Cyprus, and Croatia are among the Southern EU countries with the highest levels of perceived corruption. The healthcare system ranks first for widespread corruption among all areas of public sector in Greece (91 percent) and second in Cyprus (60 percent). A common feature of the above countries (except Cyprus) is that they apply the “mixed” model health system.

On the contrary, the Nordic countries such as Denmark, Finland and Sweden are among the countries with the lowest levels of corruption in the specific area of the healthcare sector. A common feature of all three countries is that they implement the Beveridge model for the National Health System (NHS) and they are distinguished for their decentralized character [84]. At this point, we have to underline that Malta which also applies the “Beveridge” model for the National Health System (NHS) is the least corrupt EU country in the Southern Europe in the specific area of the healthcare system.

Regarding the perceived corruption among officials awarding public tenders, we found that this public sector is the third most corrupt in five Southern EU countries (Slovenia, Cyprus, Italy, Croatia, and France). Moreover, the level of corruption has increased in all Southern EU countries (except Portugal) and especially in Italy (58 percent; +9).

On the other hand, Portugal, apart from being the only one of the Southern EU countries where the perceived corruption among officials awarding public tenders has decreased (currently is 48 percent), the percentage decrease of seven points (-7) is the best performance all over the EU. Portugal has also the lowest perceived corruption in the specific area of public procurement. Additionally, Malta has the lowest level of corruption of all Southern EU countries in the specific area of officials awarding public tenders. Comparing the two countries we found a common characteristic. Both Portugal and Malta operate a centralized healthcare procurement system with an

established central purchasing body. It is also noted that the implementation of healthcare procurement centralization in Southern EU Countries with decentralized or mixed health systems (e.g. Italy, Croatia) has resulted in a significant drop in prices of up to 25 percent without affecting the level of quality.

In summary, our findings shown that the centralization of public procurement is becoming established throughout the Southern EU Countries. This trend is confirmed by the proposals of the European Commission's Expert panel on effective ways of investing in Health (EXPH), according to which, a prerequisite for creating a more innovative, effective, and sustainable health system is inter alia the development of strategic purchasing using digital technologies as well as collaborative procurement including joint procurement at European, national, and regional level [74]. Additionally, as stated in par. 69 of the Directive 2014/24/EU on public procurement, the majority of EU Member States increasingly use centralized procurement techniques.

Future research should take into account that healthcare procurement is rarely full centralized or decentralized [85,86]. The categorization of healthcare procurement according to its level of centralization necessitates identifying the spectrum of capabilities available, which span from minimal coordination among healthcare providers to aggregated collaborative procurement.

Conclusion.

The relationship between centralization of procurement and perceived corruption in the healthcare sector is an important element in the recent debate on the policy design of a procurement system. In this study, employing an analytical research design of two phases that summarizes recent interdisciplinary literature on healthcare procurement of the Southern EU Countries (MED-9), we made an attempt at examining this issue in the light of degree of centralization and in combination with the processing of corruption perception indices in the public healthcare sector. In the first phase of the study, we identified three types of organizational structures: Centralized, Decentralized and Hybrid procurement. We discussed the results which revealed significant differences in the healthcare procurement among the MED-9 countries confirming that they vary due to their different organizational structure and socioeconomic choices. We ascertained a growing strategic trend towards centralizing purchases, within the healthcare systems of the MED-9 countries. We found that the centralized health procurement system with a central purchasing body, which operates within the framework of a decentralized Beveridge model (NHS), is proving to be the most successful combination in both anti-corruption and cost reduction terms. Our findings also suggest that healthcare procurement centralization through a central purchasing body can be an effective and powerful tool for cost reduction and fight corruption in the public health sector.

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