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Assessing the impact of socioeconomic determinants and management models on primary health care in Catalonia

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KEYWORDS
Primary health care;
Health services research;
Patient satisfaction;
Organizational models;
Quality indicators

Abstract
Objective: To assess the influence of management model and population's socioeconomic profile on two key outcomes in Catalonia's primary care: patient satisfaction and drug cost per user, aiming to support evidence-based reforms of the regional health system.
Design: Cross-sectional observational study.
Site: Primary care centers.
Participants: People attended in primary care in Catalonia.
Interventions: None.
Main measurements: Aggregated data about health and quality results summarized in a total of 19 indicators extracted from the 2023 Catalan Results Center dataset were analyzed. Descriptive, comparative, and multivariate linear regression analyses were applied.
Results: No significant associations were found between satisfaction or pharmaceutical spending and the management model or socioeconomic index. Patient satisfaction was primarily explained by experience-related variables, including accessibility, personal care, loyalty, and home care provision (adjusted $R^2 = 0.87$). Pharmaceutical spending was associated with care intensity, as measured by the number of visits, polypharmacy, hypertension control, flu vaccination, and prescriptions per user (adjusted $R^2 = 0.73$).

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Conclusions: The findings suggest that clinical and organizational factors are more influential than population characteristics or management models in determining outcomes in primary care. Reforms should focus on enhancing the patient experience, improving clinical efficiency, and adopting a humanistic approach to care delivery.
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PALABRAS CLAVE
Atención primaria de salud;
Investigación sobre servicios de salud;
Satisfacción del paciente;
Modelos organizativos;
Indicadores de calidad

Impacto del perfil socioeconómico de la población y del modelo de gestión en los resultados asistenciales en atención primaria en Cataluña

Resumen
Objetivo: Analizar el impacto del modelo de gestión y del perfil socioeconómico de la población sobre 2 resultados clave de la atención primaria en Cataluña: la satisfacción del paciente y el gasto farmacéutico por usuario. El propósito es aportar evidencia útil para orientar las reformas del sistema sanitario catalán.
Diseño: Estudio observacional y transversal.
Emplazamiento: Centros de atención primaria.
Participantes: Personas atendidas en atención primaria en Cataluña.
Intervenciones: Ninguna.
Mediciones principales: Se analizaron los datos agregados sobre resultados de salud y calidad, resumidos en un total de 19 indicadores extraídos del conjunto de datos de la Central de Resultados de Cataluña de 2023. Se aplicaron análisis descriptivos, comparativos y de regresión lineal multivariante.
Resultados: No se hallaron asociaciones significativas entre la satisfacción ni el gasto farmacéutico con el modelo de gestión, ni con el índice socioeconómico. La satisfacción del paciente se explicó principalmente por variables relacionadas con la experiencia asistencial: accesibilidad, trato personal, fidelidad y atención domiciliaria (R^2 ajustado = 0,87). El gasto farmacéutico estuvo asociado a la intensidad asistencial: número de visitas, polimedicación, control de hipertensión, vacunación antigripal y recetas por usuario (R^2 ajustado = 0,73).
Conclusiones: Los resultados sugieren que los factores organizativos y clínicos son más determinantes en los resultados de la atención primaria de salud, que las características poblacionales o el modelo de gestión. Se destaca la necesidad de avanzar hacia reformas que fortalezcan la experiencia del paciente, la eficiencia clínica y una visión humanista de la atención.
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Introduction

Primary health care (PHC) forms the essential foundation of modern healthcare systems. It acts as the first point of contact, often multiple times a year per individual, offering comprehensive, continuous, and person-centered care for common health issues while coordinating with other healthcare levels.[1] PHC is vital for removing barriers to accessing health services. It plays a key role in reducing health disparities related to socioeconomic factors, thereby helping to lower health inequities.

Since the Declaration of Astana[2] of 2018, reinforcing the role of PHC in a sustainable health system for universal health coverage, it has experienced a major growth, with advances in team structures, service delivery, and public awareness. However, many high-income countries, including Spain, are currently facing a major crisis in PHC.[3]

In Catalonia, this issue is becoming increasingly clear: primary care centers are experiencing overcrowded appointments, long wait times, limited access to diagnostic tests and specialist services, and a funding system that has not kept up with the growing demand for these services. Meanwhile, societal changes such as an aging population, labor market instability, and increasing cultural diversity present new challenges for primary healthcare (PHC). Increasing workload, promoting the specialty in medical schools, reducing administrative burden, creating new roles professionals covering other supporting areas, improving inter-level communications, promoting ''social-prescribing'' are some of the proposed solutions.[4]

When adapting these recommendations to the Catalan context, Varela[5] proposed a pragmatic framework of ''Gold Standard'' criteria for primary healthcare, outlining practical and actionable strategies. Similarly, the recent NHS report led by Lord Darzi[6] highlights the urgent state of the UK healthcare system and advocates for investments in community-focused care, clinical innovation, and technology, while also empowering both patients and healthcare professionals and addressing bottlenecks in specialist care.

One of the most significant advancements in our healthcare system has been the emphasis on patients within the clinical relationship, guided by patient-reported outcomes

and experiences – an approach aligned with value-based care.[7] Initiatives like the Patient Experience Framework[8] proposed in Catalonia aim to develop prototypes and pilot programs that can be expanded to other healthcare settings and systems, promoting a primary health care (PHC) model that stresses value.

This study aims to evaluate the influence of two key factors – socioeconomic characteristics of the population and the management model of primary care centers – on primary healthcare (PHC) outcomes in Catalonia. The objective is to generate evidence to guide future health system reforms.

Material and methods

Study design

A cross-sectional observational study was conducted using aggregated data from primary healthcare centers within the Catalan Publicly Funded Healthcare System (Sistema Sanitario Integral de Utilización Pública de Cataluña, SISCAT). The unit of analysis was the primary care facility, categorized by management model: Institut Català de la Salut (ICS), Associative Base Entities (Entidades de Base Asociativa, EBA), and Integrated Healthcare Organizations (Organizaciones Sanitarias Integradas, OSI).

Data source

The data were obtained from the Central de Resultados (CdR), an initiative led by the Department of Health of the Generalitat de Catalunya and managed by AQuAS (Agency of Health Quality and Assessment of Catalonia). It provides open-access data through a web-based platform.[9] For this study, the analysis used the most recent year with complete data, 2023, drawing on both outcome and contextual indicators to assess the study objectives.

Variables analyzed

The CdR includes 44 primary care indicators across six areas. For this study, 19 indicators were selected. Excluded indicators were sometimes related to a summary one (e.g. attended population at the center...), or appropriateness of specific drugs in specific populations (e.g. inadequate use of benzodiazepines in anxiety) among others.

The analysis focused on two main dimensions:

- Patient satisfaction as the leading indicator. This measurement was extracted from the PLAENSA survey plan, a annually study promoted by the Catalan Health Service (https://catsalut.gencat.cat/ca/coneix-catsalut/presentacio/instruments-relacio/valoracio-serveis-atencio-salut/enquestes-satisfaccio/). The survey evaluates among other indicators, patient's satisfaction towards the different services provided by the primary health care center.
- Efficiency was assessed using patient-adjusted healthcare spending included in the CdR.

Other recorded information was about:

- General data: Assigned population, attended population, total consultations, average duration of sick leaves (incapacidad temporal, IT), and contractual expenditure.
- Appropriateness: The percentage of patients with polypharmacy.
- Effectiveness includes vaccination coverage (such as childhood immunizations and influenza vaccines), blood sugar control in patients with diabetes mellitus (DM), blood pressure management in those with arterial hypertension (HTN), and participation in the home care program (ATDOM).
- Efficiency: Healthcare spending per patient and prescriptions per capita.
- Patient experience: Ease of obtaining same-day appointments, quality of interactions with physicians, nursing staff, and administrative personnel, overall satisfaction, and patient loyalty.
- Information and communication technologies: Indicators are not included in the current analysis.

Additionally, the Composite Socioeconomic Index (Índice Socioeconómico Compuesto, ISC), published by the Catalan Health System Observatory, was utilized at the facility level to estimate deprivation levels. This index captures unmet needs due to resource shortages, covering both economic and non-economic factors.

Statistical analysis

The statistical analysis was conducted in three successive phases.

1. A detailed descriptive analysis was performed to outline the population profile of the primary care centers, both overall and by management model.
2. A bivariate analysis was performed to explore the relationships between indicators and satisfaction levels using Pearson's correlation coefficient. Differences among the indicators and groups defined by the management model and deprivation level were examined with ANOVA. When the assumption of equal variances was violated, Welch's test was applied. If parametric assumptions were not met, the Kruskal–Wallis test served as a non-parametric alternative.
3. Multivariable analysis: Linear regression models were created to identify the most important factors influencing the two main outcome measures: patient satisfaction and pharmaceutical expenditure per user. Fully adjusted (saturated) models included all available explanatory variables. Interaction effects between organizational and contextual factors were not examined due to increased complexity and difficulties in interpreting the resulting models.

Results

Profile of primary care centers included in the study

This study examined performance indicators from 379 primary health care centers (PHCC) across Catalonia. On

Table 1 Profile of the 379 primary care centers included in the study.

Indicator	Mean (SD) [range]
Percentage of polypharmacy patients (appropriateness)	4.07% (1.16) [0–8, 61]
Childhood vaccination coverage (effectiveness)	86.95% (5.04) [44.64–95.64]
Influenza vaccination coverage in adults aged ≥65 (effectiveness)	49.53% (5.24) [34.83–62.95]
Home care services (effectiveness)	1.14% (0.40) [0.03–3.84]
Pharmaceutical expenditure per user (efficiency)	235.10 (55.28) [0.11–357.17]
Prescriptions per user (efficiency)	20.11 (3.76) [0–43]
Patient satisfaction (user experience)	7.72 (0.53) [5.63–8.98]
Patient loyalty (user experience)	85.82 (6.87) [60.02–98.99]

average, each center served a population of 20,962.74 people (SD = 9405.23), with an annual service coverage rate of 79.49% of total assigned population (SD = 7.93). The average number of visits per person per year was 6.68, ranging from 0.03 to 11.51 visits among PHCC. Table 1 provides a detailed overview of the structural and operational features of the centers included in the study. According to the management model, 78.1% of centers were managed by the Catalan Health Institute (ICS), 18.47% by other healthcare entities (OSIS), and 3.43% operated under the community-based EBA model.

Regarding the deprivation index (ISC), 48% of PHCC were in areas classified as medium-high deprivation, 33% as medium-low, 10% as high deprivation (the most socioeconomically disadvantaged), and 9% as low deprivation (the most socioeconomically advantaged).

Relationship between primary care outcome variables, socioeconomic characteristics of the population, and management models

The interaction between healthcare outcome variables and the two dimensions under study – the socioeconomic characteristics of the population and the management model of the centers – is notably varied. Some indicators are closely related to the population served, especially in terms of socioeconomic factors. Others mainly relate to the management models of the centers (ICS, OSIS, EBA), while some variables are connected to both dimensions simultaneously. The following indicators are direct and statistically associated with the economic level of the reference population: ratio of attended to assigned population, public pharmaceutical expenditure, prescriptions per capita, prevalence of Polypharmacy. Other statistically significant indicators, but inversely associated were: assigned population, quality of nursing care, and user service experience. These indicators reflect overall system performance, efficiency, appropriateness of care, and patient experience.

Indicators significantly linked solely to the healthcare management model (ICS, OSI, EBA) include: total healthcare expenditure, childhood immunization coverage, blood pressure control, home care program implementation, and overall patient satisfaction. These encompass one overall performance metric, several measures of clinical effectiveness, and patient experience.

The following outcome variables were found to be linked to both the socioeconomic characteristics of the population and the management model of the centers: total number of visits, sick leave, influenza vaccination coverage, diabetes mellitus control, ease of scheduling appointments, and patient loyalty. In contrast, the variable related to the physician's interpersonal treatment did not show a statistically significant link with either dimension.

A variable-level analysis shows that PHCC serving more socioeconomically advantaged groups tend to have different structural and performance traits. These centers usually cover smaller service areas and have lower patient volumes, with fewer patients taking multiple medications. They also display higher influenza vaccination rates, spend less on pharmaceuticals from their budgets, and prescribe fewer medications. Additionally, people in these populations report easier access to care on appointment days, higher overall satisfaction, and greater patient loyalty. Although not explicitly shown in the data tables, there is also more use of digital health platforms like Meva Salut and e-Consulta among these groups. Wealthier populations do not show significant differences in sick leave duration or in the clinical management of diabetes or hypertension.

Impact of outcome variables on patient satisfaction

Patient satisfaction showed statistically significant links with several healthcare performance indicators. The strongest link was with patient loyalty ($r = 0.872$, $p < 0.01$), followed by the ease of scheduling appointments ($r = 0.777$), the quality of interactions with administrative staff ($r = 0.707$, $p < 0.01$), and interpersonal communication with medical personnel ($r = 0.670$, $p < 0.01$). The link between satisfaction and interaction with nursing staff was more moderate ($r = 0.497$, $p < 0.01$). Other variables had lower correlation coefficients, but they were still statistically significant. Patient loyalty exhibited a strong correlation with satisfaction, likely reflecting a shared dimension of positive care experience. Overall, the primary determinants of satisfaction are directly linked to subjective aspects of the patient's experience with the healthcare system.

When applying a multivariable model with patient satisfaction as the dependent variable, the results reveal a highly explanatory model (adjusted $R^2 = 0.87$), identifying four key factors with significant influence: accessibility ($p < 0.01$), interpersonal treatment with doctors ($p < 0.01$) and nurses ($p = 0.017$), patient loyalty ($p < 0.01$), and home-based care coverage ($p = 0.031$). Neither the management model (ICS, OSIS, EBA) nor the Composite Socioeconomic Index (ISC) demonstrated any significant association with patient satisfaction.

Neither the management model nor the Composite Socioeconomic Index (ISC) showed a statistically significant influence on patient satisfaction within the multivariable

Table 2 Patient satisfaction scores by Socioeconomic Deprivation Index and management model.

	Satisfaction Mean [95% CI] (*n*)
Deprivation index[*]	
Low	7.87 [7.70–8.04] (*n* = 34)
Medium low	7.77 [7.68–7.87] (*n* = 120)
Medium high	7.68 [7.60–7.76] (*n* = 176)
Very high	7.56 [7.40–7.72] (*n* = 37)
Management mode[**]	
ICS	7.73 [7.67–7.79] (*n* = 292)
OSIS	7.60 [7.45–7.74] (*n* = 69)
ACEBA	8.09 [7.83-8.36] (*n* = 13)

[*] $p = 0.04$.
[**] $p = 0.008$.

Table 3 Pharmaceutical expenditure per user by Socioeconomic Deprivation Index of the reference population and center management model.

	Pharmaceutical expenditure per user Mean [95% CI] (*n*)
Deprivation index[*]	
Low	210.76 [199.42–222.10] (*n* = 34)
Medium low	236.63 [230.53–242.72] (*n* = 120)
Medium high	253.27 [246.63–259.91] (*n* = 176)
Very high	268.88 [256.84–280.91] (*n* = 37)
Management mode[**]	
ICS	248.59 [243.49–253.68] (*n* = 291)
OSIS	236.66 [228.51–244.82] (*n* = 70)
ACEBA	217.74 [200.28–235.19] (*n* = 13)

[*] $p < 0.01$.
[**] $p = 0.0023$.

model, despite both demonstrating individual significance in the bivariate analysis (see Table 2).

Impact of variables on economic outcomes

The pharmaceutical expenditure per user showed strong correlations with several indicators, including the number of prescriptions per user ($r = 0.717$, $p < 0.01$), the percentage of patients with polypharmacy ($r = 0.693$, $p < 0.01$), and the total number of visits ($r = 0.467$, $p < 0.01$). Additional statistically significant correlations were observed, although their coefficients were below 0.3, indicating weaker associations.

The multivariable regression model evaluating pharmaceutical expenditure per user exhibits a robust explanatory capacity, evidenced by an adjusted R^2 of 0.73. Six variables were identified as statistically significant predictors of economic outcomes: number of primary care visits ($p < 0.01$), prevalence of polypharmacy ($p < 0.01$), blood pressure control ($p = 0.001$), home-based care coverage ($p = 0.002$), influenza vaccination coverage ($p < 0.01$), and number of prescriptions per capita ($p < 0.01$).

The multivariable analysis of pharmaceutical expenditure per user indicates that the total number of primary care visits, prescriptions per capita, prevalence of polypharmacy (defined as the use of more than 10 medications), blood pressure control, the population receiving home-based care (ATDOM), and influenza vaccination coverage are significant predictors of variations in healthcare expenditure.

In this case, neither the management model, patient satisfaction, nor the Composite Socioeconomic Index (ISC) showed a statistically significant impact on the economic outcome within the multivariable model, despite each showing statistically significant differences in the individual bivariate analysis (see Table 3). Pharmaceutical expenditure is more strongly linked to factors related to care intensity and clinical practice patterns than to population-level or structural factors.

Discussion

This study analyzed the influence of two key factors – socioeconomic characteristics of the population and the management model of primary care centers – on selected outcomes in primary care in Catalonia, specifically patient satisfaction and pharmaceutical expenditure. The findings offer relevant insights that may inform future healthcare system reforms.

Firstly, neither the socioeconomic status of the population nor the organizational management model (such as ICS – integrated care systems, OSI – integrated health organizations, or EBA – basic health entities) acted as direct determinants of either patient satisfaction or per capita pharmaceutical expenditure. Instead, patient satisfaction primarily depends on subjective aspects of the care experience, such as access to services, the quality of interactions with staff, and patient loyalty. These elements closely reflect the user's perspective on care quality.

On the other hand, pharmaceutical expenditure per user is related to consumption intensity and clinical practices, such as the number of visits, the degree of polypharmacy, blood pressure control, and vaccination frequency. These are, therefore, factors more closely linked to professional clinical management than to population or structural characteristics.

However, there are factors not considered in this study that are likely essential for understanding the variability in outcomes across centers. These include the training and experience of professionals (e.g., the percentage of physicians specialized in family medicine), the availability of diagnostic tools (such as ultrasound), waiting times for tests and referrals, and the quality of interactions between different levels of care. All of these should be addressed in future analyses.

It is important to remember that primary healthcare reforms in the 1980s mainly aimed to address health inequalities[10] and support vulnerable populations. This strategic shift not only transformed the healthcare system but also significantly impacted social cohesion in many communities. Considering the differences this study has found among some indicators by the population deprivation index, it becomes essential to preserve the trust in the public healthcare system and to ensure that disadvantaged groups are not excluded, maintaining this focus on equity.

Following numerous evaluative studies on primary health care and various management models implemented in Catalonia,[11,12] some of which were published as academic reports,[13] the Government of Catalonia has established the CAIROS Committee (Comitè d'Avaluació, Innovació i Reforma Operativa del Sistema de Salut),[14,15] under the Department of Health, to develop specific policy measures that can be applied within the Catalan healthcare system and assessed for potential expansion. It is expected to be a strategic platform for promoting structural and operational reforms that address the real needs of primary care in the region.[16]

Furthermore, it is essential to incorporate a humanistic perspective into both clinical practice and organizational design. As Borrell emphasizes,[17] this approach is driven by two main factors: understanding the human side of patients and professionals within their social and cultural contexts and fostering the moral and intellectual development of healthcare providers, both of which are crucial for enhancing service quality and performance.[18]

The primary care reforms initiated in Catalonia are mainly concentrated at the meso level of the healthcare system. The results of our study demonstrate the need to ensure comparability between teams serving different populations and managed by entities of different natures. In both areas, promoting equity and a humanistic perspective in the work of healthcare professionals are essential.

This study has several limitations. As an ecological analysis, it cannot establish causality. Although the multivariable models were robust and well-adjusted, they did not include individual-level data on patients or professionals. Additionally, the deprivation index was based on aggregated and outdated data from 2017, which may not accurately reflect current socioeconomic conditions. Qualitative organizational variables – such as leadership style, workplace climate, and team culture – were also omitted, despite their potential relevance. Furthermore, the small number of centers operating under the EBA model limits the statistical power to detect significant differences within this subgroup.

Aligned with the Quadruple Aim framework,[19] there is growing recognition that professional well-being may be positively connected to better care outcomes.[20] In this context, expanding specific tool, based on structured and anonymous surveys, that allows for the systematic evaluation of the work experience of healthcare professionals could provide valuable insights into their work experiences and how this impact service delivery.

Conclusions

Healthcare service production is inherently complex and sensitive, influenced by numerous clinical and human factors. Therefore, it is crucial to promote a new model of collaboration between clinical professionals and healthcare managers,[21] one based on greater autonomy, shared responsibility, and a humanistic ethos, which can also help protect against burnout.[22] Simultaneously, there is an urgent need to develop a research agenda focused on healthcare management, aimed at generating evidence to guide both current practices and future innovations within health organizations.

CRediT authorship contribution statement

All authors have read and approved the manuscript. We declare that the requirements for authorship have been met.

Declaration of generative AI and AI-assisted technologies in the writing process

None declared.

Ethical considerations

Data are anonymous, aggregated and published open access.

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Conflict of interest

The authors declare no conflict of interest.

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