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Study on the concentration, distribution, and persistence of health spending for the contributory scheme in Colombia

Oscar Espinosa^{1*} , Rocco Friebel² , Valeria Bejarano¹ , Martha-Liliana Arias³ , Don Huseureau⁴  and Adrian Smith⁵

Abstract

Colombia is among the countries with the most robust financial protection against personal health spending in the world, with out-of-pocket spending ranking lowest across OECD countries. We investigate the evolution, distribution, and persistence of health spending by age group, sex, health care setting, health condition and geographic region for over 19 million users of Colombia's health system between 2013 and 2021 (contributory scheme). We use average patient-level expenditure data from the Health-Promoting Entities of the Ministry of Health and Social Protection. We applied multivariate statistical techniques such as multiple correspondence analysis, factor maps and correlations. For both sexes, average health expenditure increases gradually with age until 60 years, accelerating thereafter abruptly. Health conditions with the highest percentage of expenditure were those related to neoplasms, blood diseases, circulatory system, pregnancy, puerperium and perinatal period. We found that home-based care in Amazonía-Orinoquía is almost non-existent, and that outpatient care represents a high proportion in all age groups (over 65%) compared to the other regions. There is a strong persistence of expenditure from one year to the next (i.e. they can provide relevant information for prediction), especially in areas with a larger supply of health services such as Bogotá-Cundinamarca. To the authors' knowledge, this is the most comprehensive and detailed micro-analysis of health spending that has been developed for a Latin American country to date.

Key messages

- Health conditions with the highest percent of expenditure were those related to neoplasms and blood diseases.
 - A significant proportion of health spending for the different life cycles is in the hospital setting.
 - Medical expenditure is concentrated in people over 60 years of age.

Reflexivity statement: We are an interdisciplinary group with different professions (health professionals, economists, etc.), three co-authors work in developing countries. There is also gender diversity among the authors and most of the authors work in public universities.

*Correspondence:

Oscar Espinosa
oaespinosaa@unal.edu.co

Full list of author information is available at the end of the article



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Keywords Healthcare expenditures, Health technologies, Financial protection, Multiple correspondence analysis, Public policy

JEL classification codes C59, H51, I18

Introduction

All health systems face budget restrictions limiting the provision of health care, regardless of their income level. In this context, it is important to establish prioritisation criteria that are financially sustainable, promote effective and equitable coverage, and optimise quality of health care provision. Longitudinal system changes arising from innovation in pharmaceutical, demographic transition and multi-morbidity, among other factors, generate further pressure on health spending [1]. For informed decision-making in public policy, it is therefore necessary to understand the distribution and potential persistence of spending across a health system, and whether this varies by geographic region, age group or disease.

The current Colombian General System of Social Security in Health (GSSSH), reformed under Law 100 of 1993, is based on the concept of structural pluralism [2]. This public management tool accepts health insurers of private or public origin (known as Health-Promoting Entities, HPEs), as well as the participation of public, private and mixed health service providers. There are three insurance schemes within the GSSSH: the contributory (people who contribute jointly and severally from their labour income), the subsidised (socio-economically vulnerable people subsidised by the State) and the special and exceptional benefit scheme (military forces, public teachers, among other State enterprises).

From an aggregate perspective, the financial situation of the GSSSH between 2020 and 2022 shows that, of total revenue, the largest percentage (57%) comes from the general budget of the nation, followed by contributions from affiliates of the contributory scheme (35%) and illustrates that these contributions alone are not sufficient for the financial sustainability of the system (see Table S1 of Supplement), generating fiscal risk that may be perceived as unsustainable [3]. With respect to the distribution of spending over the same period, 82% was allocated to the Capitation Payment Unit (CPU) of the contributory and subsidised schemes (understood as a risk premium given to each insurer to manage the health risk of affiliates -according to sex, age and geographic region-) and 9% was invested in health technologies (i.e. medications, health procedures, medical supplies, etc.) that are not included in the health benefits plan charged to the CPU (see Table S2 in Supplement).

It is important to note that the GSSSH finances 96.9% of health procedures and 93.7% of the drugs approved and available for use in the country with CPU resources, making it one of the broadest and most comprehensive

benefit plans in the world [4]. This is reflected in low out-of-pocket spending (13.7% in 2021), protecting the most vulnerable households. Colombia is a global example in this respect [5].

The Ministry of Health and Social Protection (MHSP), as a regulatory entity, instructs the GSSSH Resources Administrator (ADRES, by its Spanish acronym), to transfer to the HPEs the necessary resources for the operation, guarantee and provision of health services to populations insured under the contributory and subsidised schemes. In 2023 these two schemes covered approximately 50 million people. Over the last few years, the range of health technologies charged to the CPU and available to the insured population has expanded, with an increase in both frequency and coverage [3]. It is therefore critical to undertake a detailed analysis of these trends by taking advantage of the publicly accessible information systems in Colombia, which are not available in most countries.

When comparing Colombia with Organisation for Economic Co-operation and Development (OECD) countries in terms of total health expenditure as a percentage of gross domestic product (GDP), we see that Colombia remains below the OECD average, although still trended upwards over the last 20 years. The same is true when disaggregating spending into government spending and compulsory health insurance, voluntary health insurance and out-of-pocket expenses [5] (Fig. 1). It is also possible to observe that during the COVID-19 pandemic period, the out-of-pocket expenditure of Colombian households remained without significant variations, given that most of the cost was covered by the government, which positively highlights the protective factor of the national health system in the face of shocks or risks.

Our research seeks to study the dynamics -time evolution- of health spending (charged to the CPU) for the contributory scheme in the GSSSH of Colombia, based on recent similar studies that have investigated different financial aspects of health systems in developed countries such as England [6], France [7], the United States [8, 9], Japan [10], Taiwan [11], Denmark [12] and the Netherlands [13]. These studies have been conducted in high-income countries, which correlates with good sources of information within their health systems to support this type of micro-analysis [14–16], an issue that generally does not apply to low and middle income countries.

The existing literature on health spending per person in Colombia is limited. Work to date has primarily focused on the analysis of specific health conditions and

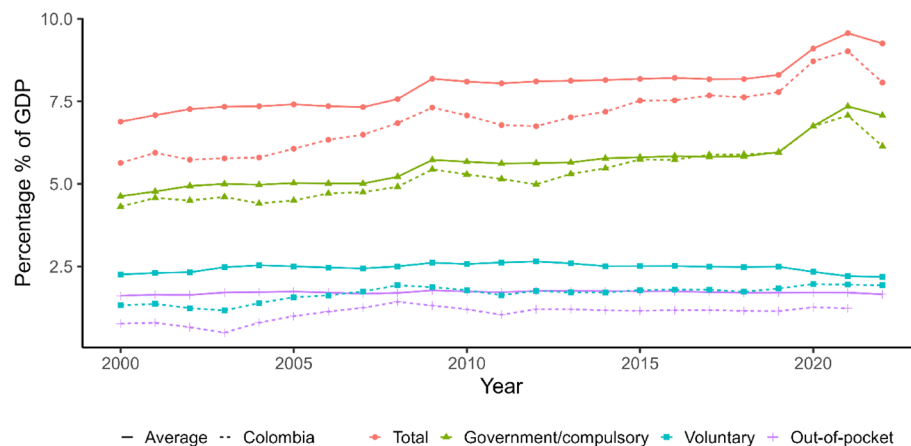


Fig. 1 Total health expenditure (and its components) as % of GDP, Colombia and OECD, 2000 – 2022. Source: <https://data.oecd.org/healthres/health-spending.htm>

has recently examined the fiscal impact of health from a macroeconomic perspective [3]. This research article, therefore, represents the first systematic analysis that investigates spending patterns at the average patient level across all health conditions, age groups, care settings, and geographic areas. The remainder of this document is structured as follows. The second section outlines the data and methods used for the statistical analysis of health spending. The third section examines how spending varies over the life cycle and across the distribution of different categories of analysis, while the final section presents the discussion.

Methods

Data were collected from the “Gestión de la Demanda (GD)” housed within the Social Protection Information System of the MHSP. It is publicly available after user registration. GD collects health spending data financed through the CPU mechanism for health insurers under the contributory scheme that have passed the MHSP’s information quality validation process (on average, the final databases have more than 79% of the total population of this insurance scheme)¹. Data are disaggregated at the level of municipality, month, healthcare setting (hospital, outpatient clinic - ambulatory, emergency room and home), chapter of the diagnosis (according to International Classification of Diseases 10th Revision - ICD-10), and type of health technology (whether it is drugs or procedure). Although individual-patient level data was not available, the level of disaggregation was believed sufficient for the purposes of this research. The period of analysis covers 2013 to 2021 (information available to date from the MHSP).

The data are aggregated into the following study categories:

- *Geographical region* – The six epidemiological regions defined by the MHSP [17], in its public policy document called “*Analysis of the health situation according to regions of Colombia*”: Caribbean, Central, Bogotá-Cundinamarca, Oriental, Pacific and Amazon-Orinoquía.
- *Age* – Age groups defined by the MHSP [18]: (i) early childhood (0–5 years), (ii) childhood (6–11 years), (iii) adolescence-youth (12–26 years), (iv) adulthood (27–59 years) and old age (60 years or more).
- *Healthcare setting* – Ambulatory care, emergency care, home care and hospital care [19].
- *Diagnosis* – The 22 chapters according to ICD-10 classification.

To characterise health expenditure, descriptive analytical techniques using Tufte’s visualisation principles [20] were applied, along with multiple correspondence analysis (MCA) and factor maps [21–23]. MCA allows for an illustrative description of the associations between the categories of the study variables, to expose patterns that may give rise to groups of similar behaviour, to synthesise the associations between categories and possible groups of interest on factorial planes. We consider the MCA as the correspondent analysis of the complete cross-table (Burt table)² where the factorial coordinates are homotheties of those of the categories of MCA. Thus, in the same plane called factorial map, it is possible to simultaneously plot several variables and their different

¹ GD does not have information on the subsidised scheme due to the poor quality of the information.

² Also known as multiple contingency table, it is a square and symmetric matrix of order the total number of categories that contains the juxtaposition of contingency tables, crossing all variables pairwise and on the diagonal, it has diagonal matrices with the frequencies of the categories of the respective variable.

categories, enabling the quick observation of associations between variables that are represented by the proximity between categories of variables, without becoming a representation of causal inference of the same [21, 24]. Pearson's correlation is also used to examine the correlation of expenditures for the same age groups over several years.

To facilitate international comparability of the intertemporal monetary analyses presented in this paper, all monetary amounts have been converted into purchasing power parity (PPP) US dollars at 2017 prices using the index calculated by the World Bank [25]. The programming language used was R, version 4.3.1.

Results

Descriptive analytics

The database analysed contains information on approximately 19.1 million people insured on average between 2013 and 2021 across 1,118 (99.6%) municipalities of Colombia, being 56% women and 44% men. The total health expenditure over the 9 years amounted to 126.4 billion US dollars PPP, which was spent on 10,983 different types of health procedures and 1,605 different types of medicines, females spent 71.8 billion and males 54.6 billion.

The concentration of expenditure resembles a 'J' shaped distribution across age groups, with average expenditure increasing across the years in each age group and the highest absolute increases observed in adulthood, for both men and women (Fig. 2). Likewise, when analysing the distribution of expenditure according to ICD-10 classification by sex, health conditions related to neoplasms –14.5%-, blood diseases –5.5%-, circulatory system –5.8%-, pregnancy, puerperium and perinatal period

–8.4%– and congenital malformations, deformations and chromosomal abnormalities –4.4%– (chapters II, III, IX, XV and XVII) are the groups with the highest proportion of expenditure (according to 9-year time average). In contrast, the health conditions with the least resources are problems related to hearing –1.3%-, skin –1.5%– and external causes –1.4%– (chapters VIII, XII and XX) (Fig. 3). The highest year-on-year growth in health expenditures was observed in the diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism –30.4%– (chapter III). In 18 health conditions, men account for a higher proportion of expenditure than women, with neoplasms and blood diseases accounting for the largest absolute percentage difference.

The levels of average individual health expenditure according to simple ages were assessed (Figure S1 in the Supplement), indicating higher expenditure associated with increasing age for infectious and parasitic diseases, diseases of the eye, adnexa, ear, mastoid process, skin and subcutaneous tissue, diseases of the circulatory, respiratory, digestive and genitourinary systems, symptoms, signs and abnormal clinical and laboratory findings (not elsewhere classified), injury, poisoning and external causes, and codes for special purposes. In some of these chapters, the age of zero - newborns - also presents a significant expenditure.

Neoplasms present a relatively high expenditure in both childhood and adolescence-youth as well as old age. Factors influencing health status and contact with health services also show a similar pattern, with high expenditure for newborns instead of during childhood. As would be expected, expenditure on pregnancy, childbirth and the puerperium is concentrated from the age of 10 until

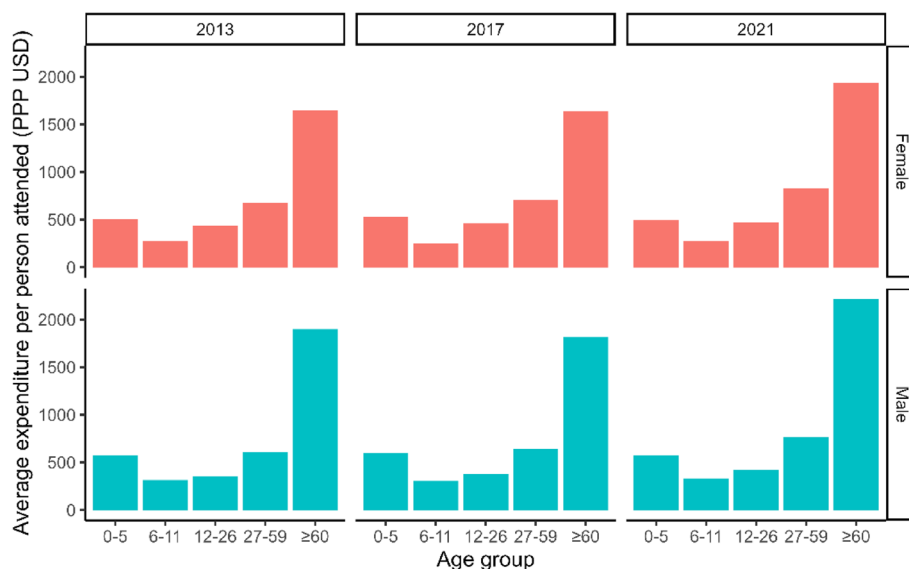


Fig. 2 Average individual expenditure by age group and sex in Colombia, 2013, 2017, 2021 (in PPP USD 2017)



Fig. 3 Evolution of the distribution of expenditure by ICD-10 and sex in Colombia, 2013-2021

before old age, which shows the unfortunate situation of pregnancy in early adolescence.

Endocrine, nutritional and metabolic diseases, mental and behavioural disorders and diseases of the musculoskeletal system and connective tissue show relatively high expenditure in adolescence-youth, and even more marked in old age. Diseases of the nervous system

exhibit the highest expenditure in early childhood and childhood. For diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism the highest expenditure is observed in the adolescence-youth age group. Lastly, health conditions that do not follow a clear pattern include conditions originating in the perinatal period, congenital malformations,

deformations, chromosomal abnormalities (although in recent years it has been observed that the older one gets the lower expenditure), and external causes of morbidity and mortality.

Tables S3 to S24 present average health expenditures by epidemiological region, sex, age group, and ICD-10 Chapters, for the period 2013–2021. Notably, the Amazon-Orinoquía region has the highest expenditure per person treated for infectious diseases (in both men and women). Women in the Caribbean and Amazon-Orinoquía regions have the highest average expenditure on mental health, with their expenditure generally between 40% and 100% higher than that of men across different regions and age groups. Regarding pregnancy, childbirth and the puerperium, the regions with the highest expenditure per woman are the Pacific, Caribbean and

Bogotá-Cundinamarca regions. The Amazon-Orinoquía and Oriental regions have the highest average expenditure per person in the country for external causes of morbidity and mortality, where the value assigned to the male sex generally exceeds that of the female sex by between 30% and 100%. This likely reflects the gendered impact of war and armed conflict in Colombia's remote regions.

Examining the evolution of the distribution of expenditure in health care settings by gender and life cycle, at the national level in Fig. 4, it is observed that before the COVID-19 pandemic most expenditure was on home care settings during childhood and adolescence-youth, whereas for other age groups was primarily related to hospital care. Between 2020 and 2021 the majority of health care expenditure was incurred in hospital settings across all age groups, which is supported by COVID-19



Fig. 4 Change in annual distribution of spending by area of health care in Colombia, 2013-2021. **A** Early childhood, female, **B** Early childhood, male, **C** Childhood, female, **D** Childhood, male, **E** Adolescence-youth, female, **F** Adolescence-youth, male, **G** Adulthood, female, **H** Adulthood, male, **I** Old age, female, **J** Old age, male

care and probably the indirect effects of this infectious disease. On the other hand, it can be observed that the share of home care has been decreasing in the distribution of health expenditure, for both sexes and across all age groups.

When we analyse the distribution of expenditure by health care settings by region and by simple age, we find that during the nine years of analysis, home care in Amazonia-Orinoquía is almost non-existent, and that ambulatory care has had a high proportion across all age groups (more than 65%) when compared to the other regions. From the age of 80 years onwards there is a decrease in the participation of ambulatory and hospital care, accompanied by an increase in home care. In addition, the areas with the lowest share of total expenditure are emergency and home care, with emergency care being more important before the age of 50 (especially for Bogotá-Cundinamarca) and home care more important in late old age (Figure S2 in the Supplement).

With regard to the health technologies with the highest expenditure by ICD-10 chapter, age group and sex, we observe that the procedures ‘emergency consultation by general medicine’, ‘first-time consultation by general medicine’ and ‘inpatient care in medium complexity service, two-person room’ appear recurrently in all ages and chapters. In old age, the procedures are also related to the ‘inpatient care in high complexity service, two-person room’. Other procedure with a considerable percentage of expenditure in old age is ‘standard hemodialysis with bicarbonate’ both in male and female and usually associated with diseases of genitourinary system and factors influencing health status and contact with health services (chapters XIV, XXI). In relation to drugs ‘coagulation factor VIII’ in adolescence-youth and childhood for diseases of the blood and the immune mechanism (chapter III) and ‘Triptorelin’ for chapter IV - endocrine, nutritional and metabolic diseases in childhood occupy the first positions as a percentage of expenditure. Similarly, ‘transperitoneal segmental caesarean section’ related to chapter XV of pregnancy is important in adolescence-youth (Table S25 in the Supplement).

Factor maps and health expenditure persistence from temporal autocorrelations

The factor maps of the performed multiple correspondence analysis are depicted in Fig. 5. When disaggregating annually by number of unique persons across all the categories described in the previous section, an inter-annual pattern is observed related to the association between diseases of the respiratory system, symptoms, signs and abnormal clinical and laboratory findings, and injury, poisoning and external causes with the scope of emergency care. Likewise, the life cycles of early childhood and childhood are associated with emergencies. On

the other hand, the Central, Bogotá-Cundinamarca and Caribbean regions are associated with outpatient setting, which is also associated to adulthood. Usually, the infectious and parasitic diseases are related to early childhood and childhood. In year 2020 there is the outstanding association between diseases with special purpose codes and home care setting, while hospital care was more closely related to diseases of the digestive system.

When the unit of analysis is expenditure, a clear association emerges between early childhood and childhood with congenital malformations, deformations and chromosomal abnormalities, and in old age with Neoplasms. On the contrary, ambulatory care is associated with females in adulthood in the Caribbean region, while hospital care is linked with males at the old age group of patients. In most years most of the expenditure in emergency was due to pregnancy, childbirth and the puerperium clearly seen in year 2020. It is important to note that most factor maps only achieve around 12% of the explained variance, therefore conclusion should be drawn with caution, as the high variability in the data cannot be fully summarised by this analysis.

Next, following Backx et al. [13] we study the serial correlation³ in health expenditures segmented by the different categories of analysis to assess the extent to which the cross-sectional concentration is likely to dissipate when the analysis is developed over a longer time horizon. In Table S26 of the Supplement, we show the correlations of average expenditures per person served segmented by the different categories of analysis one, two and up to six years apart⁴. The correlation between expenditure in year t and $t + 1$ is generally high, above 0.51 in absolute value, with values close to 1 and -1 and the majority near 0.77. The lowest values are mainly found in regions that do not have a comprehensive health services offering, in contrast to Bogotá-Cundinamarca, where the temporal persistence of health expenditure is very high across different age groups and healthcare settings.

The correlation between expenditure in year t and $t + 2$ is, as expected, weaker, but still significant with a mean in absolute value of 0.45 and similar values around 0.5 in the different lag of times considered. Thus, on average, as the time horizon of the data moves away from the data, their correlation decreases. Following different studies in the international literature [13, 30, 31], this research reaffirms that health expenditure at t is a good predictor of expenditure at $t + 1$, however, having more

³ The usual Pearson correlation coefficient is computed [26], after testing the null hypothesis of normality among the 5,160 times series, with the normality tests of Shapiro-Wilk [27], Anderson-Darling [28] and Cramér-von Mises [29], 3,216 series did not reject the null hypothesis, thus the usual correlation coefficient is selected.

⁴ We present the correlations where the mean absolute value is greater or equal to 0.91.

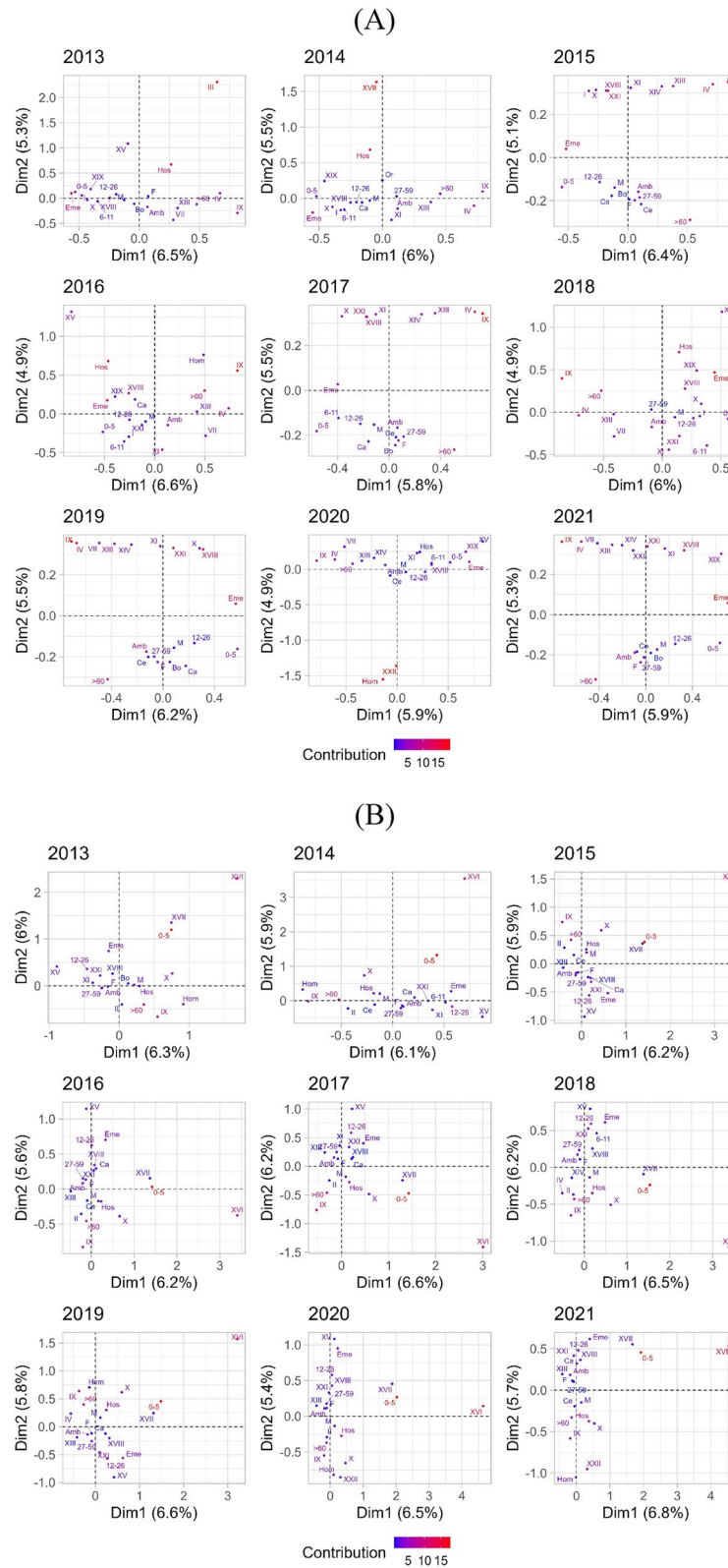


Fig. 5 Factor maps of (A) unique people, (B) expenditure in health in Colombia, 2013–2021. Note: The abbreviations correspond to, M – male, F – female, Amb – ambulatory care, Hos – hospital care, Eme – emergency care, Hom – home care, Am – Amazon-Orinoquia, Bo – Bogotá-Cundinamarca, Ca – Caribbean, Ce – Central, Or – Oriental and Pa – Pacific. The number in parenthesis correspond to the explain variance of the axis

years of historical data may be even more favourable for improving prognostic ability.

Discussion

Our research highlights that the greatest financial burden as a proportion of total expenditure is on health conditions related to factors influencing health status and contact with health services and diseases of the circulatory system. When analysed by average expenditure per person, diseases of the blood and haematopoietic organs and certain disorders affecting the immune mechanism are the most costly to the health system in Colombia. These results are in line with findings from the United States and the European Union [32–34], where it has also been identified that one of the disease groups with the highest economic burden relates to blood disorders.

During the years of the COVID-19 pandemic, hospital care accounted for more than two-thirds of total medical expenditure for the different life cycles and epidemiological regions. Medical expenditure is concentrated among people over 60 years of age and is expected to increase further in the future due to the upcoming demographic shift in Colombia. Countries such as the Netherlands and Denmark [12, 13] are already experiencing this significant fiscal burden on their health systems with risky implications for their financial sustainability. It will therefore be crucial for the government to design public policies that take advantage of the current demographic bonus, as some Asian countries have done [35, 36].

The challenges faced in rural Colombia are significantly greater than in urban areas. Although the contributory regime provides better access to healthcare [37], the provision of healthcare services of a certain level of complexity is difficult in remote regions due to the lack of hospital infrastructure and a shortage of specialised healthcare professionals [38]. This leads to a low frequency of use of health services and higher costs, particularly for complex services, which can exceed the national average (as seen in the Amazon-Orinoquia region). In contrast, metropolitan cities experience a higher frequency of use of health services, despite occasional lower costs for health technologies compared to the national average.

In addition, this study shows that there is a significant degree of historical persistence in health spending across the country (regardless of the segmentations studied), we recommend that decision-makers begin to incorporate all available historical information into the actuarial calculations for the CPU rather than relying solely on year $t - 1$ for pricing in year $t + 1$, as is currently the case. Taking advantage of all the information intrinsic to the time series of health expenditure can substantially improve the future financial sufficiency of this health risk premium, as it would incorporate to some extent the clinical history of patients and not just their most recent records. Recent

actuarial studies reaffirm this finding for the Colombian health system [39].

We identified three limitations in our research. The first is that our study does not consider health outcomes. Unfortunately, the information systems (databases) open to the public of the MHSP do not allow for direct linkage between health expenditures at the individual level and any indicator of health outcomes. However, this work represents a first approach to understanding the dynamics of health spending from an average patient's point of view. It would be prudent in the future to conduct causal inference research at the individual level (for the whole country) where the impact of patients' health investment can be studied.

The second limitation is that we deal exclusively with the contributory scheme (which covered 45.8% of total affiliates in 2022), since the subsidised scheme, which serves the most vulnerable and poorest people in the country (49.9% of total affiliates in 2022), does not have quality data and therefore these are not available to the public. However, the information that is available, which is analysed in this research, does have the application of multiple quality checks by the MHSP, ensuring high data quality. Finally, the publicly accessible database used in this research (GD) does not include individual records but presents aggregated values according to the different segmentations analysed (which does not allow for the calculation of measures of intra-group variability). Nevertheless, this did not prevent us from studying the temporal and category-specific dynamics of average expenditure per patient and provide relevant information on this topic in the Colombian health system.

The MHSP, which has information systems covering more than 50 million inhabitants of Colombia, individual by individual, and their follow-up over the years, possesses a source of knowledge of incalculable value for the design of public health policies, which could be exploited by applying predictive analysis techniques and artificial intelligence. This could be used, for example, to assess the impact of risk management by different insurers or to provide early warning systems on the volatility of health technology prices.

Although Colombia has significant opportunities for improvement, especially in terms of effective access in rural areas and timeliness of clinical specialist care, it has one of the best financial protection indicators in the world, even though its per capita health spending is not as high as that of many OECD countries. Knowing that financial resources are scarce anywhere in the world, the dynamics of any health system must constantly evolve. Therefore, intersectoral public policy actions should aim for continuous improvement in the allocation and optimisation of resources.

In the case of Colombia, the government should strengthen the processes of designing and subsequently updating the health benefit plan charged to the CPU, ensuring that health spending is efficient, equitable and orderly. The inclusion of the cost-effectiveness threshold, already robustly estimated for Colombia with real-world data [40], should also be reviewed as a criterion (not the only one) for the entry of new health technologies to be financed with public resources, as is done in the UK and Thailand. In addition, this could also be applied for the pricing of new medicines.

Following the line of policy recommendations for an efficient allocation of resources that may have a positive impact on people's well-being, we believe it is necessary for the government to construct, define and estimate health status preferences for the Colombian population as soon as possible (although there are some initial studies, there is still no rigorous research that presents a representative estimate for the whole country) [41]. Having this set of representative values will contribute to the understanding of evidence-based decision-making regarding which health technologies should be funded with public resources. Countries in the region such as Mexico have recently moved in this direction [42].

Conclusion

In conclusion, while financial protection of households is a notable strength of the health system in Colombia, it is imperative that the state consolidate a rational, up-to-date and participatory health benefit plan update (i.e. public spending should invest in cost-effective and safe health technologies for patients). This effort must be accompanied by supervision based on comprehensive risk management by public agencies vis-à-vis insurers, health service providers and other strategic stakeholders. The appropriate use of information systems and evidence-based decision-making will be the key aspects for the development of the public health policy recommendations outlined here.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12913-024-11636-2>.

Supplementary Material 1.

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Authors' contributions

OE: conception and design of the work, data collection, data analysis and interpretation, drafting the article, critical revision of the article, final approval of the version to be submitted. VB: data collection, data analysis and interpretation, drafting the article, final approval of the version to be submitted. RF, MLA, DH, AS: data analysis and interpretation, drafting the

article, critical revision of the article, final approval of the version to be submitted.

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Availability of data and materials

Data availability statement: The authors declare that they had full access to all of the data in this study and the authors take complete responsibility for the integrity of the data and the accuracy of the data analysis. The data and programming code can be found at https://github.com/vbejaranos/Health_Spending_Colombia.

Declarations

Ethics approval and consent to participate

Ethical approval for this type of study is not required by our institutes, as the data are aggregated and anonymised, publicly available.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

¹Economic Models and Quantitative Methods Research Group, Centro de Investigaciones para el Desarrollo, Universidad Nacional de Colombia, Bogotá, D.C., Colombia

²Department of Health Policy, London School of Economics and Political Science, London, UK

³Department of Accounting Sciences, Pontificia Universidad Javeriana, Bogotá, D.C., Colombia

⁴School of Epidemiology and Public Health, University of Ottawa, Ottawa, Canada

⁵Department of Population Health, University of Oxford, Oxford, UK

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