Characterization of the Population Affiliated to the Subsidized Health Insurance Scheme in Colombia. A Systematic Review and Meta Analysis.

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Abstract

Background: Some reports suggest differences regarding health needs between the population affiliated to subsidized health insurance scheme (SS) compared to the contributory health insurance scheme (CS) in Colombia. Therefore, the objective of this study was to identify the epidemiological profile of the population affiliated to the SS in Colombia, to establish if there are differences compared to CS in terms of: incident diseases, prevalent diseases, and use of health services and to estimate the magnitude of the differences from statistical analyzes of the data retrieved in a systematic review of data published in the literature and other sources of information.

Methods: Following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) methodology. The search was made from 1993, with none other restriction. The information was synthesized in five categories according to the most important risk populations. We estimated combined incidences from epidemiological surveillance data, prevalence ratio, and other measures to estimate the difference between the studied groups. A 95% interval confidence was considered. A random effects models were used weighted by the inverse of the variance of the cumulative incidence calculated for each disease. The risk of bias was assessed using Joanna Briggs Institute critical appraisal tools.

Results: 16.236 we identified, 14.972 were exclude after the title and abstract screening, 725 articles were verified as full text and finally 268 articles were included. The relative risk for non-communicable and communicable diseases was lower in the SS than the RC (RR: 0,37 and 0,72 respectively, p-value <0,05), however, for the other three categories, differences were found, the risk of presenting obstetric and maternal conditions in the SS versus the CS was RR 1,55, for frequent conditions during early childhood and other diseases was RR 1,28 with p-value < 0,05 respectively. The use of health services was different by scheme, finding less demand, access, or provision in health services in the SS.

Conclusions: This study allowed to conclude that there are differences in the incidence, prevalence, and use of health services between health affiliation scheme (SS and CS) in Colombia allowing to guide decision-making to stakeholders.

Registration: PROSPERO Registration number CRD42021279234.

Background

The General System of Social Security in Health (SGSSS) in Colombia is the mechanism by which the public health service is regulated and creates the conditions for the access of the population to all levels of health care, this system is integrated by the State through the Ministry of Health and Social Protection (MHSP) and other government entities; began its regulation through the Law 100 of 1993, which is the current comprehensive social security system in the country (1). This law, in order to guarantee access to health care, established that for each affiliated person a Capitation Payment Unit (CPU) is recognized for Health Promoting Entities (HPE) (2). The CPU is defined as the annual value recognized by each person affiliates to the SGSSS to cover the benefits included in the Health Benefit Plan (HBP). Likewise, Law 100 of 1993 stipulated an insurance system by schemes that includes the contributory scheme (CS) and the subsidized scheme (SS) (3).

All persons linked through a labor contract, public servants, pensioners and independent workers with the ability to pay can join the CS who, through a monthly contribution to an HPE, access health services through Health Service Provider Institutions (HSPI). The people affiliated with this scheme can be dependent or independent workers with income, who can guarantee the monthly contributions and in turn the additional payments that must be made in health matters, such as moderating fees and copayments - these payments being proportional to the income of each person (1).

On the other hand, the subsidized scheme is characterized by affiliating people without the ability to pay and vulnerable in the country, that is, those classified as level 1 or 2 in the Beneficiary Selection System (BSS) and priority special populations such as people in forced displacement, abandoned child population, boys and girls disconnected from the armed conflict, indigenous communities, elderly people in protection centers, people from the witness protection program, street dwellers and Rom peoples, among others (according to classification 3 of the BSS). This population can also choose the HPE that provides health care services through an HSPI (1)(4).

Currently, the value of the financing that is allocated for health coverage in each of the scheme is different, as is provided in Resolution 2503 of 2020, which assigns the budget for the CPU for the year 2021 according to the scheme, either contributory or subsidized. The CPU estimate is the product of the technical-actuarial analysis of the information reported by the HPE to the Ministry of Health, where the main frequencies of use of the health services provided are identified. It is important to note that the quality of the information of the CS is superior to the SS. Additionally, government certified sources are taken into account to consider factors such as: demographic changes in the relevant population, the national epidemiological profile, health technologies available in the country, general illnesses and maternal conditions covered in the promotion of health and prevention phases of the disease and the prevention, diagnosis and treatment of pathologies according to the use of services and levels of care and complexity. Particular characteristics of population subgroups such as the indigenous population are also taken into account, for whom a different percentage of CPU is available due to their sociocultural, demographic and epidemiological differences (5).

The analysis of these characteristics to define the monetary values of the CPU for each scheme is carried out in order to collect the differences that may occur in the risk of becoming ill and to present differential health results in the affiliated population. These differences, which are tangible especially in health outcomes, have been described in the SGSSS in Colombia. The Ministry of Health in 2015 demonstrated the inequities in health in the country in terms of mortality, as well as a possible relationship of this with the population density indices. This analysis also evidenced a positive correlation between infant mortality rates and socioeconomic inequity, observing that the departments that presented improvements in the Gini coefficient maintained lower levels in those rates (6).

Other differences in the consumption of health resources and in the presentation of communicable diseases have also been reported. Mejía et al. (7), published an analytical study that analyzed the equity in access to health services in the department of Antioquia, as well as its main determinants, finding that education, age and type of affiliation to social security were the main factors that determine the access to preventive and curative services. On the other hand, Hilarion-Gaitán et al. (8), evaluated social inequalities in health in Colombia, using the type of affiliation to the health system as a representative parameter of the socioeconomic condition, for this, they carried out a descriptive and retrospective study where the incidence rates for events were calculated. In the SS population, 82.31 more cases of *Plasmodium falciparum* malaria were reported per 100,000 affiliates than those reported in the CS, additionally, belonging to the SS was associated with a greater risk of dying from malnutrition in children under five years of age, specifically 31.74 times more compared to CS.

Although there are some reports and seminal studies that suggest that may be different health needs in the population affiliated to the SS compared to the needs of the CS in Colombia, determined by differences in the burden of disease, health outcomes and use of health services, it has not been proven whether these differences exist across the spectrum of diseases, nor is the magnitude of these dissimilarities recognized. Therefore, the objective of this study was to identify the epidemiological profile of the population affiliated to the SS in Colombia, establish if there are differences compared to CS in terms of: incident diseases, prevalent diseases and use of health services and estimate the magnitude of differences from statistical analyzes of data retrieved in a systematic review of data published in the literature and other sources of information.

Methods

The protocol for this systematic review (SRL) was registered on PROSPERO prior to starting the literature search CRD42021279234. A systematic and exhaustive literature search was carried out. The entire process followed the international quality standards used by the Cochrane Collaboration (9). The review was guided by the following research question: What is the epidemiological profile and the features of use of health services for the population affiliated to the SS of Colombia?

We took into count, all the population linked to the SS as our target population and the main outcomes assessed were I). the epidemiological profile of transmissible diseases, non-transmissible diseases, obstetric and maternal conditions, frequent conditions during early childhood and other conditions (external causes), and II). use of health services.

Inclusion and exclusion criteria

The search and selection of studies and other documents was guided by the elements of the structured question. All documents that presented information on: i) population affiliated to the SS in Colombia, ii) data such as incidence, prevalence, absolute and relative distribution of communicable and non-communicable diseases, other conditions or pathologies, use of health services, iii) exclusive information on the subsidized scheme or comparative analysis against CS were included. This SRL was not limit by language or type of study, and the timeframe considered was from 1993 to 2021.

Search strategy

Four bibliographical databases (Medline, Embase, Scielo and LiLacs) were systematically searched for studies published between January 1993 and September 2021. The threshold was considered from 1993 due from that date was issued the Law 100 regarding the classification by health scheme in Colombia.

Relevant literature was identified following search algorithms summarized in Supplementary table 1. MeSH, Emtree y DeCS term were use such "epidemiology", "health insurance", "subsidized", "subsidized health insurance scheme", "regimens". Additionally, a non-indexed data search was performed in 22 web sites related to this topic (table 1). Studies identified through each database were imported to Mendeley, and then duplicates were identified and removed. The studies were then imported to Rayyan.

Study selection

The title and abstract screening were reviewed by one author (LMM) and was verified by a second independent reviewer (KEO); disagreements were resolved by consensus.

Those studies that met the eligibility criteria previously described were included. The full text screening was carried out independently by two reviewers (LMM and KEO). Disagreements were resolved by consensus. The complete screening and selection process used was presented using the flow diagram proposed by the PRISMA statement (10).

Data extraction

The relevant data for this systematic review were extracted by a reviewer (LMM) and independently verified by a second reviewer (KEO), using a data extraction form designed in Excel, which was adjusted after the pilot extraction carried out with two of the articles. The information was extracted prioritizing studies with a cohort-type epidemiological design, cases and controls, prevalence, and descriptive observational ones. Subsequently, the information was extracted from documents and reports of epidemiological surveillance reports and finally, the documents from repositories of academic databases and gray literature.

Quality assessment

The quality assessment was conducted by reviewing each study according to critical appraisal tool made by the Johana Briggs Institute (11). These tools assess focus in different aspects such; (i) type of design; (ii) how outcome variables were assessed; and (iii) if confounding variables were controlled. Quality assessment was performed by one researcher (LMM). Consensus was reached in consultation with a second author (KEO) as needed.

Analysis of the systematized papers

The synthesis of the information of all the included studies and documents was carried out in a descriptive way, additionally, synthesis tables were elaborated for the relative frequency measures (incidence and prevalence) or absolute frequency reported in them. The incidences of health conditions were calculated according to five categories of interest: non-communicable diseases, communicable diseases, maternal and obstetric conditions, early childhood health conditions and other diseases not classified in the previous ones. For each category the following operational definition was used (additional file 1, table 1):

Non-communicable diseases: They result from the combination of genetic, physiological, environmental, and behavioral factors.

Communicable diseases: They are contagious or infectious diseases, caused by specific infectious agents or their toxic products in a susceptible host.

Maternal and obstetric conditions: They are a set of physiological events and pathophysiological alterations that affect women in reproductive age, including the prenatal, natal, and postnatal periods.

Common conditions in early childhood: Group of diseases that occur frequently in boys and girls from 0 to 5 years old. In this group of diseases, perinatal conditions and congenital defects are considered.

Other diseases: It refers to external causes such as accidents, trauma, poisoning, and other events that affect the integrity and health of people, which are not related to the health conditions already mentioned.

The information was presented summarized according to the disease group analysis categories and the distribution of health services uses, according to the affiliation scheme. For some absolute frequencies reported in surveillance systems, the incidence estimator was calculated using as denominator the population affiliated to the CS or the SS according the study period, for example: the report of infection by the human immunodeficiency virus (HIV) reported in 2020 there were 5.167 cases belonging to the SS where the affiliated population for this scheme in the same year was 24.307.637 people, while the number of cases reported in the SC was 6.213 out of a total of affiliates of 21.796.582. The affiliates by scheme were obtained from the Unique Affiliate Database (UAD) (12).

On the other hand, combined incidence estimation were generated from data from epidemiological surveillance systems at the national level, using metaregressions taking into account a 95% confidence interval. In addition, random effects models were used weighted by the inverse of the variance of the cumulative incidence calculated for each pathology and each period of time to the report, considering the high expected heterogeneity due to: incidence estimators for different health conditions grouped in five categories of analysis (noncommunicable diseases, communicable diseases, maternal and obstetric conditions, early childhood health conditions and other diseases not classified in the above) and different observation periods (13–15). The heterogeneity values were confirmed by calculating the I² estimate. These results are summarized in “forest plot” graphics. In total, 10 models were built using the statistical software STATA 14 (16).

For health services, the frequencies of use of health services were calculated for the people affiliated with each scheme, the SS prevalence ratio between the CS and the *odds ratio* as a measure of association.

Results

Literature search results

In the indexed databases consulted, a total of 5,235 references were found and 11,001 references were found in gray literature and official sources such as web pages of official national institutions, repositories of universities and non-profit organizations. The detail of the search results is presented in Table 1.

Table 1. References found in gray literature and official sources

N°	Databases	Results
1	Ministry of Health and Social Protection	663
2	National Administrative Department of Statistics	4
3	Google scholar	400
4	Interagency Coordination Platform for Refugees and Migrants from Venezuela – R4V	88
5	Institutional Repository University of Antioquia	241
6	Institutional Repository University Nacional	663
7	Institutional Repository Pontificia University Javeriana	496
8	Institutional Repository University of Andes	1.253
9	Institutional Repository University of Bosque	62
10	Institutional Repository University of Rosario	1.423
11	National Institute of Health	2.010
12	Colombian Association of Comprehensive Medicine Companies	48
13	Foundation for Higher Education and Development	4
14	Foundation for Research and Development of Health and Social Security	11
15	Colombian Association of Hospitals	20
16	Office of the General Comptroller of the Republic	400
17	National Superintendency of Health	3.062
18	Vital Return	3
19	Econometrics Consultants	2
20	Ombudsman's Office	50
21	High-Cost Account	5
22	Bank of the Republic	10
23	Center for Studies in Social Protection and Health Economics	29
24	Inter-American Development Bank	33
25	World Bank	21

Of the 16,236 references found, 529 were excluded because they were duplicates, 15,707 were screened by title and abstract, and 735 references were evaluated in full text. Finally, 268 documents were included (see Additional file 1. Table 2-3). The information flowchart is detailed in the PRISMA *Figure 1*.

The included studies contain information from 1993 to 2021; 42 articles were obtained from indexed databases (17–58). Of these, four have a retrospective design (23,24,46,55), two are case series (32,49), one case-control study (31), five cohort studies (21,30,45,47,56), 27 prevalence studies (cross sectional) (17,20,22,25–29,33–42,44,48,50–52,57–59), one descriptive study (18) and two studies ecological (43,54). Through google Scholar, 21 references ((60–79), 156 annual reports from the Colombian National Institute of Health INS (80–102,102–108,108–210), two reports from R4V (211,212), a report from the website of the Ministry of Health and Social Protection were included (213), and two from the High Cost Account page (214,215). The selected references whose source were the academic repositories of the Colombian universities were 44; 23 from the National University of Colombia (74,216–237), 11 from the University of Rosario (87,89,157,238–245), 3 from the University of Antioquia (246–248), 3 from the University of Andes (249–251), 2 from the University of Bosque (252,253), and 2 from the University Javeriana (254,255).

Of the documents found, 162 came from public sources and 106 from private sources. Regarding the type of document, three were poster summaries, 65 articles, 3 report summaries of notification events in power point format, 6 technical reports of outbreak studies, 22 infographics, 129 reports of epidemiological surveillance events, 2 press reports, 38 academic thesis. The references that contained information at the national level were 193, 75 at the regional, departmental, or municipal level. Among the main cities described in the analyzed documents are Bogotá, Barranquilla, Medellín, Cali, Tunja, Cartagena, Chocó, Guainía, Pasto, Popayán, Santander, Villavicencio, Manizales, Bucaramanga, and Pereira.

The number of documents and references according to the category of analysis: health condition and use of health services, is presented in Table 2.

Table 2. Bibliographic references for each category

Category of analysis by health condition or use of health services	Number of documents (%) N=268	References
Non-communicable diseases	60 (22.4)	(17,21,26,27,29,30,33,41,44,45,47,57,65,66,68,71,73,74,74,79,84,86,90,128,130,143,166,175,179,183,188,199,203,209,216,223,248,250,252,254,256–267)
Communicable diseases	129 (48.1)	(8,24,32,34,38,39,49,51–54,56,60–62,76,77,80–83,88,91,93,95,96,98–106,110–124,126,127,129,132,133,135,137–140,144,156,158–161,163,172,173,177,178,182,184,185,187,189,191,194–198,200,201,204,207,210,220,223,237,241,249,251,255,257)
Maternal and obstetric conditions	26 (9.7)	(48,72,102,102,107,108,108,109,150,157,168,169,197,197,217,224,230,242,246,247,289–293)
Common conditions in early childhood	17 (6.3)	(40,46,70,75,94,97,131,164,170,180,193,218,221,294–297)
Other diseases (external causes)	11 (4.1)	(64,136,186,192,234,298–300)
Health services	25 (9.3)	(18,22,25,36,37,42,44,58,59,63,67,78,211–213,226,228,229,235,238,245,253,301–303)

Behavior of the disease according to the subsidized and contributory scheme in Colombia

Non-communicable diseases

Incidence data were collected from reports from the National Institute of Health (INS) for mandatory notification events classified as noncommunicable diseases: cancer, rheumatoid arthritis, transplants (kidney, heart, liver, lung), rare diseases, malnutrition, and exposure to fluorine.

The data related to the incidence of the disease were 17 reports (143,166,175,188,203,209,214,215,259–261) and 34 to data on the distribution of diseases in morbid groups of patients (15,18,44,54,62,63,65,68,70,71,71,76,23,81,83,87,126,128,24,177,181,186,188,197,214,217,220,27,223,225,229–231,237,242,246,248,250,30,252,254–261,37,38,41,42).

Communicable diseases

INS reports were the main source of information for this category, including data on diseases such as ophidian accidents, attacks by animals transmitting rabies, acute chagas, chronic chagas, chikungunya, dengue, chickenpox, malaria, diphtheria, equine encephalitis, meningococcal disease, yellow fever, typhoid and paratyphoid fever, hepatitis B, hepatitis A, infections associated with medical-surgical procedures, acute respiratory infections, leishmaniasis, leprosy, leptospirosis, bacterial meningitis, acute flaccid paralysis, mumps, congenital rubella, measles, congenital syphilis, Accidental tetanus, whooping cough, tuberculosis, HIV AIDS, Zika. 78 documents were included. (9,21,52,199,202,205,206,208,218,221,262–269,270–273,58,59,77–79,29,80,85,88,90,92,93,95–98,31,99,101–104,108–112,35,113–120,120,121,36,122,124,125,127,130–133,135,136,46,137,138,142–147,149,150,49,151–154,154,156–160,50,161,165,170,171,175,176,180,182,183,51,185,187,189,192–196,198,199) and 15 studies offered information on the distribution of the population in the subsidized scheme (32,51,56,60,76,77,148,154,223,237,241,249,251,255,287).

Maternal and obstetric conditions

For the conditions that affected women in a fertile state, 10 studies were taken into account that indicated the incidence of the following alterations: gestational syphilis, maternal mortality and extreme maternal morbidity (69,148,166,167,189,195,195,195,99,228,244,245,100,105,105,106,106,107,148); and seven (48,157,217,224,242,293) showing the distribution of their population according to the affiliation scheme (CS and SS).

Common conditions in early childhood

This category included 11 references, nine from INS reports, and two articles resulting from indexed databases (168,178,191,219,276,277,72,91,94,129,162), reporting incidences of health conditions and early childhood illness as outcomes such as: underweight at birth, perinatal mortality, late neonatal mortality and congenital malformations. Five studies showed the distribution of their population for SS and CS (40,46,70,218,221).

Other diseases

For the category “other diseases”, 11 references were considered, of which nine came from INS reports (82,134,174,184,190,200) and two results from other sources (64,234). The incidence of cases of pathologies was taken into account: violence from gender and domestic violence, external causes due to aesthetic procedures and consumption accidents, intoxications, sexual abuse and maxillofacial trauma.

Subsidiary scheme

Non-communicable diseases

The noncommunicable diseases that had the highest incidence during the observation period (2016-2021) were cancer (all types) for the year 2020. Heart, lung, and kidney transplants with living donors were the least incidents. Details of the data can be found in additional file 2 – Table 1.

The combined measure of cumulative incidence for non-communicable diseases in Colombia in the SS during the aforementioned time period was 0.000197 (95% CI: 0.000191 to 0.000203). The details of the accumulated incidents by affiliation scheme are presented in Table 3 and their graphic representation in the forest plot of additional file 2 - Illustration 1.

Table 3. Cumulative incidence for diseases and other health conditions in Colombia by affiliation scheme during the years 2016-2021

	Subsidiary scheme			Contributive scheme			SS/CS	p-value
Categories	Cumulative incidence	95% confidence interval		Cumulative incidence	95% confidence interval		Relative Risk RR	
Non-communicable diseases	0,000197	0,000191	0,000203	0,000526	0,000506	0,000546	0,374000	0,000000
Communicable diseases	0,000124	0,000120	0,000127	0,000171	0,000165	0,000177	0,725146	0,000000
Maternal and obstetric conditions	0,000166	0,000131	0,000201	0,000107	0,000088	0,000127	1,551402	0,000000
Common conditions in early childhood	0,061682	0,060620	0,062744	0,048309	0,047478	0,049141	1,277000	0,000000
Other diseases (external causes)	0,000397	0,000374	0,000420	0,000309	0,000284	0,000333	1,284790	0,000000

SS: subsidized scheme, CS: contributory scheme

From the studies that described the frequency distribution of non-communicable diseases according to the affiliation scheme and that were published between 2004-2020, information was obtained on different types of cancer, high blood pressure, asthma, cardiovascular diseases, chronic skin diseases, autoimmune joint inflammatory diseases, nutritional deficiencies, and diseases of the oral cavity. The conditions whose number of cases in the SS was higher due to those in the CS were breast cancer, chronic diseases in general, and epilepsy. Details are presented in additional file 3, table 1.

Communicable diseases

For this category, 78 documents were considered between reports and studies. 32 pathologies were included, for the observation period 2012 to 2021 chickenpox and chikungunya the highest incidence and neonatal tetanus and diphtheria the lowest incident cases (additional file 2 - Table 2). The cumulative incidence for SS was 0.000124 (95% CI: 0.000120 to 0.000127). The details of the cumulative incidences by affiliation scheme are presented in Table 3 and their graphic representation in the forest plot of additional file 2- Illustration 2.

From the studies that described the frequency distribution of communicable diseases according to the affiliation scheme and that were published between 2011-2021, information was obtained on vector-borne diseases, acute respiratory infection, tuberculosis, sexually transmitted infections and intestinal parasitic infection. Except for acute respiratory infection, multidrug-resistant tuberculosis, and Zika, all the other communicable conditions had a greater number of cases in the SS than the number of CS cases in the cohorts studied. The conditions with the highest ratio SS / CS were chagas disease, congenital syphilis and gestational syphilis. Details are presented in table 4. (32,51,56,60,76,77,148,154,223,237,241,249,251,255,287).

Table 4. Distribution of cases by scheme in morbid cohorts of communicable diseases between 2011-2021

Author, year	Health condition	Data source	Cases SS	Cases CS	Total	Ratio SS/CS
Curtidor, 2016(77)	Tuberculosis	TB control follow up program	22	203	225	0,1
Urrego, 2019(251)	Acute respiratory infections	National Demographic and Health Survey	171.051	736.746	915.942	0,2
Núñez, 2017(223)	Acute respiratory infections	National Administrative Department of Statistics	23.061	72.493	106.764	0,3
Ruiz, 2017(249)	Zika	SIVIGILA	126	279	2.325	0,5
INS, 2018(154)	Acute chagas	INS	9	8	822	1,1
Paniagua, 2021(56)	Tuberculosis	SIVIGILA	3.215	3.032	6.739	1,1
Angel, 2012(60)	sexually transmitted diseases	Profamilia, Hospital of Fontibón, Hospital of Engativá	637	485	1.444	1,3
Quintero, 2011(255)	sexually transmitted diseases	National Health Survey	12.603	9.484	29.760	1,3
Ettenger, 2014(51)	HIV	National Demographic and Health Survey	3.603	2.755	10.596	1,3
Gomez, 2019(237)	HIV	High Cost Account	14.758	8.807	23.803	1,7
Bouwman, 2016(241)	Intestinal parasitic infection	Community	121	69	190	1,8
Zabaleta, 2019(32)	Tuberculosis	National Reference Laboratory	32	17	51	1,9
Agudelo, 2016(148)	Congenital and Gestational Syphilis	SIVIGILA	48	10	71	4,8
INS, 2018(287)	Chronic chagas	INS	341	33	388	10,3
Echavez, 2018 (76)	Congenital syphilis	SIVIGILA	741	45	845	16,5

SS: Subsidized scheme, CS: Contributory scheme, HIV: human immunodeficiency virus, TB: tuberculosis, INS: National Institute of Health, SIVIGILA: Public Health Surveillance System

Maternal and obstetric conditions

The INS was the main source of information for this category, taking incident data from conditions such as extreme maternal morbidity between the years 2018 to 2021. Of the total of 10 reports included, extreme maternal morbidity was the condition with the highest incidence and maternal mortality was the one with the lowest incidence (Additional file 2 - Table 3). The pooled incidence measure for SS was 0.000166 (95% CI: 0.000131 to 0.000201). The details of the accumulated incidents by affiliation scheme are presented in Table 3 and their graphic representation in the forest plot additional file 2 -Illustration 3.

From the studies that described the frequency distribution of obstetric and maternal conditions according to the affiliation scheme and that were published between 2016-2021, it can be observed that the conditions whose number of cases in the SS was higher due to those in the CS were maternal mortality and extreme maternal morbidity (48,157,217,224,242,293) those details are presented in Table 5.

Table 5. Distribution of cases by scheme in morbid cohorts of obstetric and maternal conditions, 2016-2021

Author, year	Health condition	Data source	Cases SS	Cases CS	Total	Ratio RS/RC
Salazar, 2017(217)	Extreme maternal morbidity	SIVIGILA	363	956	1.384	0,38
Yepes, 2016(293)	Extreme maternal morbidity	Second and third level institutes	340	485	1.011	0,7
Arocha, 2021(157)	Prenatal care, breastfeeding	Community	536	360	1.416	1,49
Álvarez-Sierra, 2020(48)	Maternal mortality	National Administrative Department of Statistics	28	18	49	1,56
Solarte, 2017(242)	Extreme maternal mortality	Hospital "la samaritana"	64	15	95	4,27
Soto, 2016(224)	Maternal mortality	SIVIGILA	15	1,1	22	13,4
Ayala, 2015(40)	Prenatal care	Individual Service Provision Registry (ISPR) and vital records	49.300	35.700	85.000	1,4
Catalan, 2010(46)	Perinatal death	Health providing institutions	3	1	7	3

SS: Subsidiary scheme, CS:Contributory scheme, SIVIGILA: Public Health Surveillance System, ISPR: Individual Service Provision Registry

Common conditions in early childhood

For this category, the information was obtained from nine INS reports and two studies from other sources (168,178,191,219,276,277,72,91,94,129,162). Congenital malformations were the pathology with the largest new cases. The result of the combined incidence measure was 0.061682 (95% CI: 0.060620 to 0.062744) for the SS. The details of the cumulative incidences by affiliation scheme are presented in Table 3 and their graphic representation in the forest plot additional file 2 - Illustration 4. Of the studies that described the frequency distribution of non-communicable diseases according to the affiliation scheme and that were published between 2014-2016, information was obtained on infant death and congenital malformations, with a ratio of 2.1 to 1 of cases in the SS with respect to the CS (70,218,221). Details are presented in table 6.

Table 6. Distribution of cases by scheme in morbid cohorts of common conditions in early childhood, 2014-2016

Author, year	Health condition	Data source	Cases SS	Cases CS	Total	Ratio RS/RC
Romero, 2017(218)	Children mortality	Community	30.402	71.852	102.254	0,4
Murica, 2014(70)	Congenital malformations	Third level institutions	246	115	416	2,1
Cordoba, 2016(221)	Children mortality	National Administrative Department of Statistics	396.561	48.265	444.826	8,2

SS: Subsidiary scheme, CS:Contributory scheme

Other diseases

This category was constituted with information from 11 references. nine from the INS between 2018 and 2021 and two studies published in 2015 and 2017 from the literature. For the SS, sexual abuse and intrafamily and gender violence were the most incident events and injuries from external causes caused by accidents related to the consumption of psychoactive substances and aesthetic procedures the least incidents (Additional file 2 – Table 5). The cumulative incidence for this scheme was 0.000397 (95% CI: 0.000374 to 0.000420). The details of the accumulated incidents by affiliation scheme are presented in Table 3 and their graphic representation in the forest plot Additional file 2 - Illustration 5.

Contributory scheme

Non-communicable diseases

For CS, the non-communicable diseases with the most incidents were cancer and rheumatoid arthritis, and the least incidents were kidney and pancreas transplantation and lung transplantation. The cumulative incidence was 0.000526 (95% CI: 0.000506 to 0.000546). The details of the cumulative incidences by affiliation scheme are presented in Table 3 and their graphic representation in the forest plot Additional file 2- Illustration 6.

From the studies that described the frequency distribution of non-communicable diseases according to the affiliation scheme and that were published between 2004-2020, it is evidenced that dental conditions, cancer and cerebrovascular disease presented a lower number of cases for CS than for the SS (additional file 2 - Table 1).

Communicable diseases

Of the 32 pathologies analyzed during the observation period 2012 to 2021, the cumulative incidence for CS was 0.000171 (95% CI: 0.000165 to 0.000177) additional file 2 - Table 2. Being chickenpox, malaria and dengue, the diseases with the highest incidence; and acute chagas and equine encephalitis the least incidents. The details of the accumulated incidences by affiliation scheme are presented in Table 3 and their graphic representation in the forest plot Additional file 2 -Illustration 7.

Among the documents that characterized the distribution of pathologies by scheme, it was found that multidrug-resistant tuberculosis and acute respiratory infections presented a higher ratio of cases with respect to SS (see Table 4).

Obstetric and maternal conditions

For this scheme, the most incident obstetric and maternal conditions were extreme maternal morbidity and the least incident maternal mortality. The cumulative incidence was 0.000107 (95% CI: 0.000088 to 0.000127). The details of the accumulated incidences by affiliation scheme are presented in Table 3 and their graphic representation in the forest plot Additional file 2- Illustration 8.

From the studies that described the frequency distribution of non-communicable diseases according to the affiliation scheme, the ratio of cases of extreme maternal morbidity for CS is 2.6 to 1 compared to the SS of the SIVIGILA data, and for maternal mortality and morbidity and mortality combined, the number of cases is lower in CS compared to SS (40,46,48,157,217,224,242,293). Details are presented in table 5.

Common conditions in early childhood

The early childhood disorder with the highest incidence in CS was neonatal death and congenital defects had the lowest incidence. The pooled incidence result of common conditions in early childhood for this scheme was 0.048309 (95% CI 0.047478 to 0.049141). These data came mostly from INS reports and information was identified between 2009 and 2021. The details of the cumulative incidences by affiliation scheme are presented in Table 3 and their graphic representation in the forest plot Additional file 2- Illustration 9.

Infant mortality presented a ratio of 2.4 for CS with respect to SS (39,45,69,217), as identified in Additional file 2 -Table 4.

Other diseases

In CS, the cumulative incidence for this category was 0.000309 (95% CI: 0.000284 to 0.000333), with intrafamily and gender violence being the most incident disease and alterations due to external causes secondary to cosmetic procedures the least incident. The source of information was the mandatory reports of the INS SIVIGILA. The details of the cumulative incidences by affiliation scheme are presented in Table 3 and their graphic representation in the forest plot Additional file 2- Illustration 10.

Comparison of disease burden between SS and CS

The relative risk for non-communicable and communicable diseases as categories was lower in the SS than in the CS (RR: 0.37 and 0.72 respectively, p-value <0.05), however, for the other three categories, Although differences are found, these represent a greater risk for the population affiliated with the SS, finding, for example, that the risk of presenting obstetric and maternal conditions in the SS versus the CS is RR 1.55, for frequent conditions of early childhood RR 1.28 and from other conditions RR 1.28, with p-value <0.05 in all cases. Details are presented in Table 3.

Non-comparative SS disease burden

The documents that presented information only for the SS between the years 1993 to 2021 were 42. Information related to pathologies such as infant malnutrition, pertussis, accidental tetanus, ophidian accident, leishmaniasis, gestational syphilis, maternal mortality, malaria, cancer (tumors solid and hematological), leptospirosis, leprosy, yellow fever, acute chagas disease, Zika, congenital defects, dengue, puerperal endometritis, infections associated with medical-surgical procedures, chronic diseases, sexually transmitted diseases, maternal complications, HIV, intestinal parasites, death perinatal and migraine.

According to the type of document, academic theses, reports of mandatory notification events, infographics, technical reports of outbreak studies, scientific articles and poster summaries were identified, coming from both public and private entities.

Non-communicable diseases

The information presented contains data between 1998 and 2021. Regarding the 3 reports presented by the INS corresponding to the pathology of cancer in children under 18 years of age, acute, moderate and severe malnutrition in children under five years of age for 2021 and 2020, a 33%, 66% and 64% of cases occurred in the RS, respectively. Table 7.

Agudelo et al. (216) carried out an ecological study published as a academic thesis whose objective was to establish the behavior of mortality due to child malnutrition in children under 5 years of age in Colombia and its relationship with some social determinants of health, the data source came of the National Administrative Department of Statistics information bases. A total of 12,165 deaths were found and the results show that the correlation between SR and mortality due to malnutrition in children under 5 years of age, children under 1 year of age, and children between 1 and 4 years of age was 0.2057 (Spearman Rho) p-value: 0.0000, Rho 0.1933 p-value: 0.0000, 0.2147 (Speaman Rho) p-value: 0.0000 respectively.

Afanador-Echeverría et al. (50) presented an abstract in which the current epidemiological situation of migraine in Colombia was analyzed, estimating the general prevalence by geographic areas based on the data obtained from the Individual records of provision of services (IRPS). This study included a total of 429,816 participants during the years 2014-2018, of which 68.8% of the diagnoses were in SS patients and 26.8% in CS patients.

On the other hand, Parra-Lara et al. (17) present a poster summary, whose main objective was to analyze the 5-year global survival of patients with gastric cancer in relation to the health scheme and the place of residence (rural or urban) in a specialized health center in the city of Cali. A total of 500 cases of gastric cancer were included, the main outcome (5-year overall survival) was different for patients affiliated to the SS 14.96% (95% CI: 4.61 to 30.95) versus 26.69% (95% CI: 19.9 to 33.94) of the CS patients (p-value: 0.0089).

Castañeda et al. (222) carried out an academic thesis (retrospective cohort) that aimed to describe the burden of disease due to acute pediatric leukemias (APL) and identify its association with inequalities in terms of affiliation scheme and department of origin in Colombia during the period 2011-2012. The data sources used were the IRPS and vital statistics registered in the DANE of the participating institution. A total of 636 cases of children who died from APL were included and the prevalence of mortality from APL for SS was 9.43 and for CS it was 9.39 and the mortality rate per 100,000 inhabitants was 1.49 for SS. CS and 2.19 for SS.

Table 7. Description of studies with information on noncommunicable diseases from the SS, 2020-2021

Author, year	Type of document	Nature	Source	Health condition	Total	Cases SS	%
INS, 2021	infographic	Public	INS	Cancer in children under 18 years of age	342	113	33,04
INS, 2021	infographic	Public	INS	Malnutrition in children under five years of age	8.643	5.789	66,97
INS, 2020	Disease report	Public	INS	Malnutrition in children under five years of age	6.988	4.515	64,61

INS: National Institute of Health, SS: Subsidize scheme

Communicable diseases

The information related to the SS was found in 37 documents, of which 30 came from the INS. These data report information between 2010 and 2021. Neonatal trachoma and tetanus accounted for all cases in the SS for 2019 and 2020, and neonatal tetanus for 2020 and 2021. The information is detailed in additional file 3, table 2.

Cardona et al. (62), published a study on the prevalence of a positive cytology result for bacterial vaginosis, candidiasis and trichomoniasis during 2010 and 2012 in the city of Medellín. The study aimed to determine the prevalence of positive cytology results for bacterial vaginosis, candidiasis, and vaginal trichomoniasis. The main source of information was obtained from the cervical cancer detection and prevention program at the Hospital Metrosalud de Medellín in the SS. 206,035 records from the program databases were included, finding that the prevalence of bacterial vaginosis was 18%, candidiasis 4.7%, and trichomoniasis 0.8%. On the other hand, Cardona et al. (60), in another study carried out in the city of Medellín between 2010 and 2011, which sought to determine the prevalence of bacterial vaginosis in women from Medellín and whose source of information came from 50 health centers and hospital units included; It was found that only 41.48% of the women in the SS was users of family planning methods.

Rivillas et al. (54) in an ecological study whose objective was to measure socioeconomic inequality and inequality related to health financing in maternal mortality in Colombia, as well as to identify the potential epicenters of this inequality, indicated that maternal mortality for the indicator of absolute inequity for expenses in health was, in the SS in the year 2012 of -10,542, 2013 of -13,979 and in the year 2014 of -64,781; While for the CS it was -32,895 in 2012, -23,241 in 2013 and -17,283 in 2014. This study concluded that there is a high inequality in maternal mortality between the regions and, in particular, in the SS.

Arrivillaga et al. (52) published a cross-sectional study that aimed to evaluate and analyze the association between adherence to treatment and the social position of women living with HIV. This study was carried out during 2006 and 2008 and was part of the project "Social perspective of adherence to treatment in Colombian women with HIV / acquired immunodeficiency syndrome (AIDS)". A total of 269 women with HIV / AIDS were included in five cities of the country (Cali, Bogotá, Villavicencio, Pasto and Medellín). The main results showed that the probability of remaining adhered to treatment is three times lower when the patient is affiliated with the SS (OR = 3,478, 95% CI: 1,957 to 6,181) compared to the CS.

Pinzón et al. (38), on the other hand, carried out a study with the objective of establishing the relationship between intestinal parasitism in children under 6 years of age and living in environmentally protected areas, without aqueduct service, in El Codito -Bogotá, Colombia. This cross-sectional study included 144 children between 4 and 70 months of age and demonstrated that, compared with affiliation to the CS, the children affiliated to the SS presented differences in the risk of intestinal parasitic diseases, however, they were not statistically significant (OR = 1.49, 95% CI 0.48 to 4.68).

According to Cortez et al. (24), who published a retrospective descriptive study that characterized perinatal mortality in Manizales between 2009 and 2012, according to sociodemographic, clinical, health care variables, affiliation scheme and their relationships, showed that the perinatal mortality rate during the years mentioned was 8.9 per 1,000 live births in the CS, and 9.8 per 1,000 live births in the SS; while the frequency of perinatal mortality was similar in both affiliation scheme (CS = 50.9% and SS = 49.1%).

Borrero et al. (43), published a study that aimed to evaluate the effect of decentralization in the context of the Colombian health system SGSSS, on the incidence of malaria in Colombian municipalities. This was an ecological study that performed a univariate analysis between the affiliation scheme and the malaria incidence rate between the years 1998-2004. The primary source of information was the departmental and municipal health secretaries. A total of 145 cases met the inclusion criteria. In the bivariate analysis between the type of affiliation and the ratio of malaria incidence rates in the municipalities, it was shown that the proportion of the municipal population belonging to the SC was 0.27 (95% CI 0.11 to 0.64), and the proportion of the municipal population belonging to the SS was 4.23 95% CI (1.98 to 9.00). Which means that the higher the proportion of the population affiliated with the subsidized regime, the higher the incidence rates of malaria in the municipalities.

Maternal and obstetric conditions

Six reports from the INS are listed in table 8 and show that 56.7% of the cases of gestational syphilis for the year 2021 were presented in the SS, likewise, for the year 2020 there was 54.3% of the same pathology in the SS population.

Díaz et al. (246), carried out an ambispective cohort study whose main objective was to determine the factors associated with complications during the third trimester of pregnancy, childbirth and the puerperium of maternal women belonging to the SS treated in a second-level institution of complexity in Medellín during the year 2012. The cohort had a total of 506 maternal included and among the main maternal complications prior to the current pregnancy of the included participants, the prevalence of abortion was 24.5%, pre-eclampsia 8.2%, premature delivery 4.3% and intrauterine growth retardation 0.9%.

Amaya et al. (72), in their cross-sectional study, had as objective to evaluate factors that were associated with 28 cases of maternal mortality that occurred during 2008 in women affiliated to an HPE of the SS, calculating the maternal mortality ratio of 28 deaths per 29,944 live births.

Acevedo et al. (230), carried out a study published as an academic thesis that aimed to identify contextual and individual factors related to maternal health, during the years 2011 to 2015 in Vichada. The pregnant women affiliated to the administrative entities of benefit plans (AEBP) of the SS had a maternal mortality ratio of 715.26 deaths per 100,000 live births and the risk of dying of the pregnant women affiliated to this scheme was 5 higher (OR = 5.48; 95% CI: 0.8812 to 226.58) with respect to uninsured pregnant women, although there were no statistically significant differences. There were no cases in women affiliated to the AEBP of the CS or to the exception scheme.

Table 8. Description of articles with information from the SS, 2018-2021

Author, year	Type of document	Nature	Source	Health condition	Total	Cases SS	%
INS, 2021	infographic	Public	INS	Gestational syphilis	6.391	3624	56,7
INS, 2018	Disease report	Public	INS	Maternal mortality	523	Maternal mortality ratio 44,0 cases per 100.000 births	
INS, 2021	Disease report	Public	INS	Puerperal endometritis	704	286	40,6
INS, 2020	Disease report	Public	INS	Puerperal endometritis	319	141	44,2
INS, 2020	Disease report	Public	INS	Puerperal endometritis	704	286	40,6
INS, 2020	Disease report	Public	INS	Gestational syphilis	5.643	3064	54,3

INS: National Institute of Health, SS: Subsidize scheme

Behavior in the use of healthcare services according to affiliate schemes in Colombia

Use of health services in affiliation schemes in Colombia described from studies and reports that reported the distribution of use differently. The number of references included was 21, which reported information between 2009-2021. Details are presented in additional file 3, Table 3.

In this table, the rates of higher frequency of use of health services in the regimens were established, it is found that the use of radiotherapy, chemotherapy and radiotherapy, mastectomy, among others, is greater when exposed to SS compared to CS. additional file 3, Table 3.

The additional file 3, Table 4. Show in greater detail a study developed by the MHSP valuating the quality of care provided in Colombia in 2014, the data showed that there is a greater risk of consumption of services, specifically for drug delivery services, hospitalization, requesting procedures to the HPE in person and not requesting procedures to the HPE when exposed to SS than when exposed to CS.

For the use of service in relation with health promotion, prevention and surgery there were no statistically significant differences between the SS and CS, and it is notable how the risk of consuming resources for general medicine services, laboratory tests, specialized medicine, emergencies, dentistry, radiography and images, priority appointments, therapies, requesting medical appointments via telephone or internet is lower when you are exposed to SS compared to CS.

Zuñiga et al. (253) published an analytical observational study, conducted during 2018, which aimed to analyze inequality in prenatal care live births in Colombia in 2018 by type of health insurance. The database of the registry of live births was analyzed, with a total of 459,238 records and within the results found: a mean number of prenatal controls for SS of 6.04 (95% CI: 6.03 to 6.05) and for CS 7.40 (95% CI: 7.39 to 7.41). Likewise, live births to mothers affiliated with the SS were 3.5 times more likely (OR=3.545; 95% CI: 3.479 to 3.611) to have four or fewer prenatal check-ups compared to the CS:(OR=0.288; 95% CI: 0.283 to 0.294).

Additional file 3, Table 5, on the other hand, shows the distribution of health services according to the affiliation scheme of the study population. Information was obtained from 3 studies, carried out between 2009 and 2019 where services such as delivery care, time of health care attention were evaluated, with a ratio between 5.41 to 1 cases in the SS with respect to the CS.

Quality assessment

Studies were assessed according to the study design. 29 articles were classified as cross-sectional studies. Eight articles (18,20,24,33,39,40,43,54) were considered with high concerns due the risk of bias mainly because of the lack of information regarding the subject's settings and the sample size. Three (23,45,47) cohort studies were flagged as high concerns due the risk of bias due unclear information about exposures measures whether control or exposed groups. One (49) study was evaluated with a case series tool and this was considered as low concerns of risk of bias. For more information see additional file 4.

Discussion

The objective of this study was to identify the epidemiological profile of the population affiliated with the SS in Colombia, to establish whether there are differences compared to the CS in terms of: incident diseases, prevalent diseases, and use of health services, and to estimate the magnitude of the differences from statistical analyzes of the data retrieved in a systematic review of data published in the literature and other sources of information. As a main result, it was determined that there are significant differences in the use of health services and incident and prevalent diseases between the population affiliated with the SS and the CS in Colombia. The direction of these differences points to the existence of a greater burden of disease in terms of morbidity and mortality for SS in the categories of obstetric and maternal conditions, which includes maternal morbidity, extreme maternal morbidity, maternal and perinatal mortality (RR 1.5), the category of frequent childhood conditions with a RR of 1.27 and finally, the category of other diseases or conditions, among which injuries due to violent causes stand out (RR 1.28).

These findings can be explained due to the greater vulnerability of the population in these categories, the pregnant population, for example, is definitely more vulnerable to barriers to access and provision of health services, these barriers translate into absent or incomplete prenatal controls, This increases the risk of detection, management and prevention of complications typical of this physiological state with consequences that can be catastrophic for the mother and the product of pregnancy.

Likewise, it is not unknown that the population affiliated with the SS presents vulnerability characteristics secondary to precarious access to essential public services, the quality of food, transportation and restricted movement, either due to its location in dispersed areas or due to difficult access when found within

population centers. These characteristics, added to the existing biological vulnerability in children under five years of age, cause the risk of morbidity and mortality to be greater in this age group, malnutrition, mortality associated with malnutrition, congenital malformations, postnatal nutritional deficiencies, among others, are problems that they occur more frequently in the population affiliated with the subsidized scheme and are mediated beyond the biological substrate, by social determinants of health.

Also, the different forms of violence that are monitored in the national information systems were predominant in the population affiliated to the SS, this gender violence, intrafamily violence, as well as sexual abuse, intoxications and consumption accidents, can be understood as a manifestation of unsatisfied basic needs, gender inequalities, lack of purchasing power, unemployment, inequality in income, level of education (303) and sociocultural patterns and historical violence such as the armed conflict, which demarcate differences in social positions (304).

Other important findings were the significant differences in the incidence of communicable and non-communicable diseases between those affiliated with the SS and CS, with a higher risk of incidence in the population affiliated with the CS. This finding, which is contrary to what is expected given the marked additional risk that has been described for the occurrence of these diseases in a population with a higher degree of vulnerability (55,305,306), can be explained for two reasons. The first one related to the quality of health information systems and registries at the national level, which constituted a primary source of information for this analysis. It is recognized that the information for the SS and the characterization of the use of health system resources, as well as the burden of disease in its affiliates is deficient, not representative and in most cases not available, which may mean in this case an underreporting of the number of cases and the systematic deviation of these incidents towards an underestimation. Also, structural, and intermediate problems of the health system, related to the location of residence of the population affiliated to the SS, deficiencies in transportation, limitations in mobility due to civil security problems, and the location and organization of service-providing institutions. They constitute barriers that limit the access of this population to care, so that care is not received in the institutions and consequently they are not recorded in the information systems. This problem also generates a bias in incidents with a tendency to underestimate.

The characterization of the prevalence of communicable and non-communicable diseases in the country according to the scheme comes from more representative studies, although fragmented by regions or municipalities in many cases. The distribution of cases in the identified morbid cohorts shows a ratio greater than 1 in the cases of patients affiliated to the SS versus CS who have chronic diseases such as cardiovascular disease and arterial hypertension (ratio 1.3: 1), lesions in skin, mortality due to nutritional deficiencies, malnutrition that represent cases of SS with respect to CS in a ratio of approximately 2: 1 or in the case of epilepsy or other chronic diseases that represent cases of SS with respect to CS in a ratio of > 3: 1.

This same pattern was observed in communicable diseases such as the occurrence of acute Chagas disease, tuberculosis, sexually transmitted diseases, HIV, intestinal parasitic infection (> 1: 1), congenital and gestational syphilis, chronic Chagas disease (> 4: 1). The relative risk of the occurrence of communicable diseases such as leprosy, congenital syphilis, whooping cough, Zika, Leishmaniasis, equine encephalitis, malaria, trachoma, and neonatal tetanus is also higher in the population affiliated to the SS than in the CS.

It is especially noteworthy in this study that in the morbid cohorts with cancer in which there is a report in national databases, the largest number of affiliates are found in the CS. Another important finding in this study is related to the presentation of the disease in the population affiliated to the SS, its severity, and the differential behavior of the clinical course of some of them. In one of the studies included in this analysis, it was evident at least for the population in Cali how screening services for malignant breast disease are provided in a 0.5: 1 ratio in women from the SS compared to those from the CS, and in women who were diagnosed with breast cancer, there was a 2.8 times higher risk of requiring mastectomy in women with this condition affiliated with the SS than in those with the CS, which may be a proxy for the severity of the disease at the time of diagnosis.

The differences found in the course of the disease are also relevant and induce a reflection on the process of care within the IPS for the population affiliated with one or another scheme. For example, in Bogotá, by 2020, it was found that the risk of having a patient with rheumatoid arthritis with high disease activity at the beginning of the two-year follow-up was lower in SS compared to CS (OR 0.1), however, upon completing the follow-up time, the risk of presenting high disease activity was higher in SS compared to CS (OR 1.8), reversing the trend observed at the beginning of follow-up in patients. Also in delivery care, cesarean sections were more frequent in CS than in SS. These findings denote a possible differential approach and other factors that are mediating the differential health outcomes in the population that demands and accesses health services in each of these schemes.

Other greater risks that in turn determine a greater burden of disease in SS patients are related to a greater possibility of having failed tuberculosis treatments (OR 1.3) or fewer complete treatments (OR 0.4), a greater possibility of having epilepsy refractory (OR 4.6), abandonment of breastfeeding (OR 1.3), fewer promotional and preventive activities such as vaginal cytology (OR 0.8), complete vaccination schedules (OR 0.4) or higher risk of having complete but late vaccination schedules (OR 2.4).

Regarding the use of services offered in the health system, the trend was also evident in terms of relative frequencies, towards less use of health services in the SS compared to the CS. Such is the case of general medicine services, medication delivery, laboratory tests, specialized medicine, emergency service care, dentistry, radiology and imaging, priority appointment care and therapies. However, the risk of requiring hospitalization in the population affiliated with the SS is greater than that affiliated with the CS (OR 1.65). The use of prevention and promotion health services (P&P) and the performance of surgical procedures does not imply an additional risk in any of the schemes (OR 1.0).

This trend in the differential use of health services, with a lower frequency of use and care in the SS, is understandable to the extent that the population affiliated with this scheme has greater barriers to access health services located beyond of the provision of services and availability of health technologies. Among them, the characteristics of informality in the work activity that generates a competition between seeking care and obtaining income that guarantees subsistence. The lower availability of tools that facilitate the request for health care services and their continuity, such as the telephone or internet service or the lack of knowledge and appropriate use of this resource, a fact that again impacts the need of transfers in person to the institutions or service points

arranged for it. This confronts them with access barriers generated by problems due to lack of transportation, mobility, geographical areas and barriers, and the availability of economic resources for it. This last phenomenon was also evident in this study, finding that the request for health services in person is 3.6 times higher in the SS, so it also occurs with procedures in person OR 2.1 and in the worst of cases the non-request for procedures or services 1.7 times more frequent in the population affiliated with the SS.

This study, which sought to identify the differences in the incidence, prevalence of diseases and use of health services between the affiliation scheme (subsidized and contributory) in Colombia, is the first of this nature, which integrates information available in the literature and sources from administrative bases and epidemiological surveillance in Colombia, combining advanced statistical methods for the estimation of combined measures of incidents and analysis of prevalences in each scheme. Additionally, formal statistical tests were carried out, which made it possible to find and quantify the magnitude of the existing differences in the occurrence of disease and use of health services in Colombia for these two health affiliation schemes.

The sources of information in turn suppose important limitations, among them, the categories of diseases generated a priori could only be fed with information on health conditions and diseases with information available in the literature or in the surveillance information bases, however, do not constitute all of the diseases that are part of these categories and in some cases, they are not the most frequent presentation.

Conclusion

This study allowed to conclude that there are differences in the incidence, prevalence and use of health services between health affiliation scheme (SS and CS) in Colombia. For the categories configured in the framework of this study as communicable and non-communicable diseases, the data showed a greater risk of becoming ill from this cause in the population affiliated to the CS, however, the certainty in this estimate is very low given the potential biases of information, selection and measurement detected in the information sources, which even allows predicting an underestimation of the incidents and prevalences of the conditions reported in the SS. For the categories of obstetric and maternal conditions, frequent conditions in early childhood and other diseases, the risk of occurrence was higher in those affiliated to the SS than in the CS. The use of health services is also different by scheme, finding less demand, access or provision in health services for general consultation, dentistry, drug delivery, emergency consultation, among others, in the SS, probably mediated by social determinants of health, other than the availability of health technologies. However, the risk of requiring hospitalization is greater in those affiliated to the SS.

These results not only allow quantifying and quantitatively demonstrating the differences that are presumed in the configuration of health in the populations belonging to the SS and CS in Colombia but can also guide decision-making regarding the aspects necessary for the actuarial estimation of values to be recognized by people according to the health insurer's scheme. It is necessary that aspects such as the social characteristics of the population are taken into account in the planning, organization and management of health risk, considering that they are determinants of the burden of disease and health results, as well as the configuration of uses services available, as well as barriers that impact the entire care process. There are many limitations in the recovered evidence, so it is necessary to promote studies that seek not only to overcome these limitations and reduce the risk of bias from the design, but also to achieve a greater degree of representativeness at the national level.

Abbreviations

Acquired immunodeficiency syndrome: AIDS

Acute pediatric leukemias: APL

Administrative entities of benefit plans: AEBP

Beneficiary Selection System: BSS

Capitation Payment Unit: CPU

Confidence interval: CI

Contributory scheme: CS

General System of Social Security in Health: SGSSS

Health Benefit Plan: HBP

Health Promoting Entities: HPE

Health Service Provider Institutions: HSPI

human immunodeficiency virus: HIV

Individual Service Provision Registry: IRPS

Interagency Coordination Platform for Refugees and Migrants from Venezuela: R4V

Ministry of Health and Social Protection: MHSP

National Administrative Department of Statistics: DANE

National Institute of Health: INS

Odds ratio: OR

Promotion health services: P&P

Public Health Surveillance System: SIVIGILA

Subsidized scheme: SS

Systematic review of literature: SRL

Tuberculosis: TB

Unique Affiliate Database: UAD

Declarations

Authors' contributions

LMM, KEO defined the scope of the research subject and developed the search strategy. LMM and KEO undertook the search, reviewed the literature, and summarized the search findings. LMM and KEO drafted the manuscript. LMM, KEO, OE, and LM, provided substantial input in the design stages of the review, critically reviewed the manuscript, and helped shape the final version of the manuscript. All authors approved the final manuscript.

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Consent for publication

All authors are agreeing with the content of this manuscript

Competing interests

The authors declare that they have no competing interests.

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Figures

Figure 1

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Diagram

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