Public Policies and Type of Insurance Are Associated With the Burden of Bladder Cancer – Related Inpatient Health Care in Chile: A Two-Decade Analysis

Ignacio Eltit,[1] Joaquín Cristi,[1] Iris Delgado,[2] Paula Huerta,[1] Sergio Fuentes,[1] Alberto Bustamante,[1,3] Mario I. Fernández[✉3,4]

[1]Facultad de Medicina Clínica Alemana Universidad del Desarrollo, Santiago, Chile [2]Centro de Epidemiología y Políticas de Salud, Facultad de Medicina Clínica Alemana Universidad del Desarrollo, Santiago, Chile [3]Servicio de Urología, Clínica Alemana de Santiago, Chile [4]Centro de Genética y Genómica, Facultad de Medicina Clínica Alemana Universidad del Desarrollo, Santiago, Chile

Abstract

Objective To quantify changes in the burden of bladder cancer (BC) inpatient health care in Chile between 2001 and 2019, focusing on the impact of public policies and the type of medical insurance (public or private) held by patients.

Methods We retrospectively collected national data on hospital discharges and calculated raw and adjusted hospitalization rates for the period of 2001 to 2019 categorized by sex and age. Additionally, we analyzed length of hospital stays, outcomes of surgical interventions, and discharge conditions based on the type of medical insurance — public: FONASA; private: ISAPRE. We also evaluated the impact of public policies such as the GES ("garantías explícitas en salud") program, which ensures opportunities and access to medical attention, financial protection, and quality of care for a subset of diseases.

Results A total of 34 100 hospital discharges were analyzed. Most patients were men (71%), and median age was 69 years. Of the patients, 91.3% had some kind of medical insurance, either private or public. Within this subset, 71.3% had public medical insurance (FONASA) and 23.2% had private medical insurance (ISAPRE). Patients on FONASA had significantly higher levels of overall surgery-related mortality (0.83% vs. 0.2%) and significantly longer median hospital stays (4 days vs. 2 days) compared to patients on ISAPRE. Following the implementation of the GES program in 2013, we observed an increase in transurethral resections and a reduction in radical cystectomies among publicly insured patients.

Conclusions The type of medical insurance has a significant impact on the burden of BC-related inpatient health care in Chile, reflecting a significant disparity in terms of health care. The implementation of public policies such as the GES program can play a key role in reducing this gap between public and private medical insurance systems, especially in underdeveloped countries.

Introduction

Bladder cancer (BC) is the seventh most common malignancy worldwide, with a global incidence of 7.4/100 000[1]. Incidence rates of BC are higher in high-income countries, particularly among men and associated with age. The main risk factor for BC is tobacco use, accounting for 50% to 60% of cases[2]. Previous studies have demonstrated that socioeconomic status, ethnicity, and health coverage are independent prognostic factors of clinical outcomes for the common malignancies, including BC (CIE-10 – c67)[3,4]. Among these factors, health coverage is particularly

Key Words

Bladder cancer, population registry, epidemiology, medical insurance, trends

Competing Interests

None declared.

Article Information

Received on January 25, 2023
Accepted on April 5, 2023
This article has been peer reviewed.

Soc Int Urol J. 2023;4(4):265–272

DOI: 10.48083/ZNKI7577

Abbreviations

BC Bladder cancer
CI Confidence Interval
FONASA Fondo Nacional de Salud
GES Garantías explícitas en salud; Explicit Guarantees in Health
ID Identification number
ISAPRES Instituciones de Salud Previsional
TUR Transurethral resection
TURBT Transurethral resection of bladder tumor
US United States

relevant due to the high costs associated with BC diagnosis, treatment, and follow-up[5]. Population-based studies conducted in the United States (US) have revealed that the type of medical insurance can partially explain differences in BC patient survival[6]. Indeed, US-based studies report lower overall survival and cancer-specific survival in BC patients without medical insurance or with public medical insurance[7].

In Chile, the health care system uses a mixed model that consists of a public medical insurance fund (FONASA: "Fondo Nacional de Salud") and private medical insurance providers (collectively called ISAPRES: "Instituciones de Salud Previsional"). According to official figures from 2018, FONASA covers 78% of the Chilean population whereas ISAPRES provides coverage for 18%. Both insurance systems are regulated by the Chilean Ministry of Health (MINSAL). The remaining 4% is covered by the armed forces and other specific insurance providers[9]. To date, private and public medical insurance systems operate independently, without formal coordination[10]. In 2005, Chile implemented the Explicit Guarantees in Health ("garantías explícitas en salud"; GES). This system ensures timely access to quality health care for a prioritized set of diseases. Since GES was introduced, it is mandatory to report the diseases incorporated into this system. BC was incorporated into the GES program in 2013, guaranteeing the staging, treatment, and follow-up for this disease. When a primary care physician suspects BC, the GES system is activated, setting the time frame by which health providers must deliver care (up to 30 days for staging and up to 45 days for treatment). The GES program also provides financial coverage for both private and publicly insured patients[11,12].

The objective of our study was to quantify changes in the burden of BC inpatient health care in Chile between 2001 and 2019, aiming to assess the impact of public policies and the type of medical insurance (public or private) held by patients.

Methods

This descriptive population-based study analyzed hospital discharges related to BC between 2001 and 2019. The publicly available databases were obtained from the Department of Health Statistics (DEIS) at the MINSAL. The collected variables included individual/patient identification number (ID), sex, age, type of medical insurance, year, and condition at discharge (alive or deceased), length of hospital stay (in days), surgical intervention (yes or no), and type of surgery. All patients with diagnoses belonging to the ICD-10 c67 classification were identified.

We only included the hospital discharges of FONASA (public insurance) and ISAPRE (private insurance), which represented 95% of the total of individuals with health care coverage[9]. Hospital discharge rates were calculated as annual discharge rate per 100 000, with a confidence interval (CI) of 95% and categorized by type of insurance. The overall rate was calculated by dividing the total number of annual BC discharges by the estimated total population obtained from the INE-CELADE and the 2017 national census. To calculate the rate according to type of medical insurance, we divided the total of discharges for each type of insurance by the total population of individuals with private and public medical insurance (ISAPRE and FONASA, respectively). These calculations were based on data obtained from national surveys and administrative bulletins.

The primary outcome of this study was to analyze the changes in the burden of BC inpatient health care in Chile from 2001 to 2019, according to type of insurance and relative to the implementation of the GES program. The secondary outcomes were inpatient mortality and length of stay of BC patients according to type of insurance for the aforementioned period.

The hospitalization burden was estimated using the annual bed-days, obtained by multiplying the number of days of hospital stays by the absolute frequency for each year and categorized by the type of insurance. To avoid registration bias of this variable, we excluded outliers (0.2% of outliers when considering length of stay < 100 days). Differences in length of stay (days) were calculated as annual median and overall values by insurance type and type of BC surgery, and they were compared over time using 3-year periods (triennial). Given the incorporation of BC into the GES program in 2013, we considered the period from 2001 to 2012 as the pre-GES period and the period from 2013 to 2020 as post-GES period.

For perioperative and overall hospital mortality, we only included BC-related surgical interventions (associated with treatment). The evolution of overall inpatient mortality over time by insurance type was analyzed using a joinpoint regression model (Joinpoint Regression Software, v.4.6.0.0 Statistical Research and Applications Branch, National Cancer Institute, US, 2018). This test quantifies the annual percentage change (APC) adjusted by autocorrelation, with a statistical significance set at $P < 0.05$.

All patient information was obtained and handled using encrypted codes for ID, strictly adhering to the privacy regulations and use of sensitive data (Chilean Act #19628).

Results

A total of 29 724 hospital discharges with BC as the primary diagnosis were recorded during the period from 2001 to 2019. As expected, most patients (71%; n = 21 113) were men, with a median of 69 years. The age range for 90% of patients (10th to 90th percentile) in this sample fell between 51 and 83 years. Almost half of them (45.9%; n = 13 635) underwent surgery. Additionally, 86.1% of the patients (n = 25 606) had some type of medical insurance, either public or private. Among this subset, 75.8% were hospital discharges of patients with FONASA (public insurance, n = 19 403), while 24.2% were ISAPRES (private insurance, n = 6203).

Over the study period, we observed a steady increase of overall hospital discharges, along with changes in their distribution according to insurance type. Interestingly, the proportion of ISAPRE users increased from 17.3% in the period from 2001 to 2003 to 23.9% in the period from 2017 to 2019. Table 1 and Figure 1 summarize the number of annual discharges and the changes in discharge rates by insurance type over time, respectively.

Regarding clinical outcomes, the overall inpatient mortality rate was 3.7%. When analyzed by insurance type, the mortality rate was higher among FONASA patients (4.4%; 95% CI 4.0 to 4.8]) compared with ISAPRE patients (2.7%; 95% CI 2.2 to 3.2; $P < 0.001$). However, we observed a significant decrease in inpatient mortality for FONASA patients (-1.74% APC) over the period from 2001 to 2019 (Figure 2). Additionally,

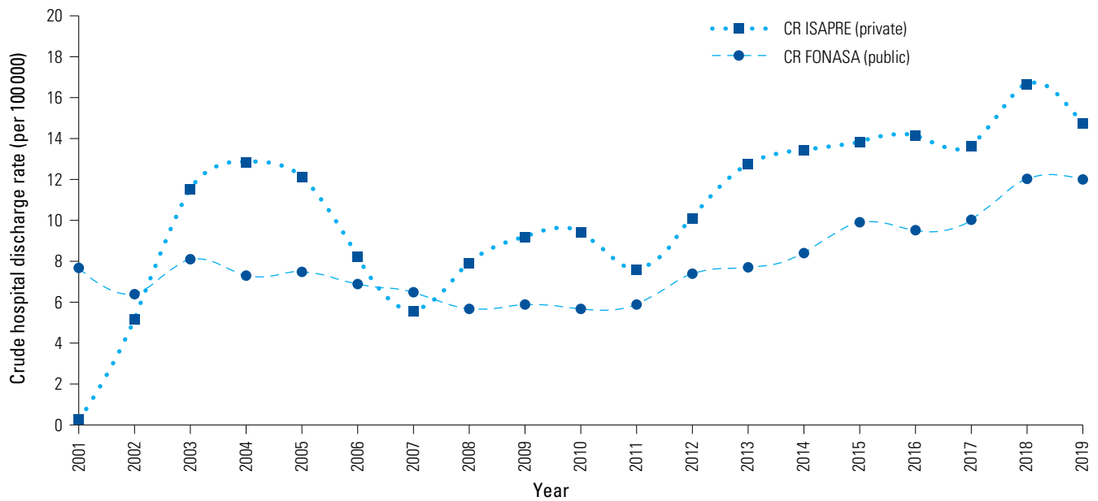
TABLE 1.

Annual hospital discharges, population, and crude hospital discharge rates per 100 000

	Hospital discharges (n)			Population (n)			
Year	FONASA (public)	ISAPRE (private)	Total	FONASA (public)	ISAPRE (private)	Crude hospital discharge rate FONASA	Crude hospital discharge rate ISAPRE
2001	791	12	803	10 156 364	2 940 795	7.7	0.4
2002	673	152	825	10 327 218	2 828 228	6.5	5.3
2003	871	317	1188	10 580 090	2 729 088	8.2	11.6
2004	808	346	1154	10 910 702	2 678 432	7.4	12.9
2005	846	325	1174	11 120 094	2 660 338	7.6	12.2
2006	811	225	1036	11 479 384	2 684 554	7	8.3
2007	777	161	938	11 740 688	2 776 912	6.6	5.7
2008	714	223	937	12 248 257	2 780 396	5.8	8
2009	759	259	1018	12 504 226	2 776 572	6	9.3
2010	748	271	1019	12 731 506	2 825 618	5.8	9.5
2011	801	227	1028	13 202 753	2 925 973	6	7.7
2012	1015	313	1328	13 377 082	3 064 719	7.5	10.2
2013	1058	413	1471	13 451 188	3 206 312	7.8	12.8
2014	1146	448	1594	13 468 265	3 308 927	8.5	13.5
2015	1338	475	1813	13 256 173	3 410 487	10	13.9
2016	1309	489	1798	13 598 639	3 427 665	9.6	14.2
2017	1414	467	1881	13 926 475	3 393 662	10.1	13.7
2018	1734	569	2303	14 242 655	3 404 896	12.1	16.7
2019	1790	511	2301	14 841 577	3 431 126	12	14.9
Total	19 403	6203	25 606				

FIGURE 1.

Annual hospital discharge rates by medical insurance type during the period of 2001–2019. Rates per 100 000 in FONASA and ISAPRE patients



CR: crude rate.

inpatient mortality for patients undergoing BC-related surgical interventions was 0.6% compared to 6.5% for those not undergoing surgery ($P < 0.001$). After adjusting for insurance type, the overall postoperative mortality rate for BC patients was 0.8% for FONASA (public) patients and 0.2% ISAPRE (private) patients ($P < 0.001$).

Among patients undergoing surgery, we observed a significant increase in transurethral resection of bladder tumors (TURBTs) and radical cystectomies over time in newly diagnosed cases, particularly following the introduction of the GES program. The total number of these procedures reached up to 2289 in the period from 2017 to 2019. This trend persisted after adjusting for type of insurance (**Figure 3**).

Median values for hospital stay also differed according to insurance, with a median of 4 days for FONASA patients and 2 days for ISAPRE patients. **Table 2** compares length of hospital stays by type of surgery, showing significantly longer stays for patients with public insurance across almost all types of surgery. Finally, **Figure 4** shows a sustained increase in annual hospital bed-days over time, starting in 2010, particularly for FONASA patients.

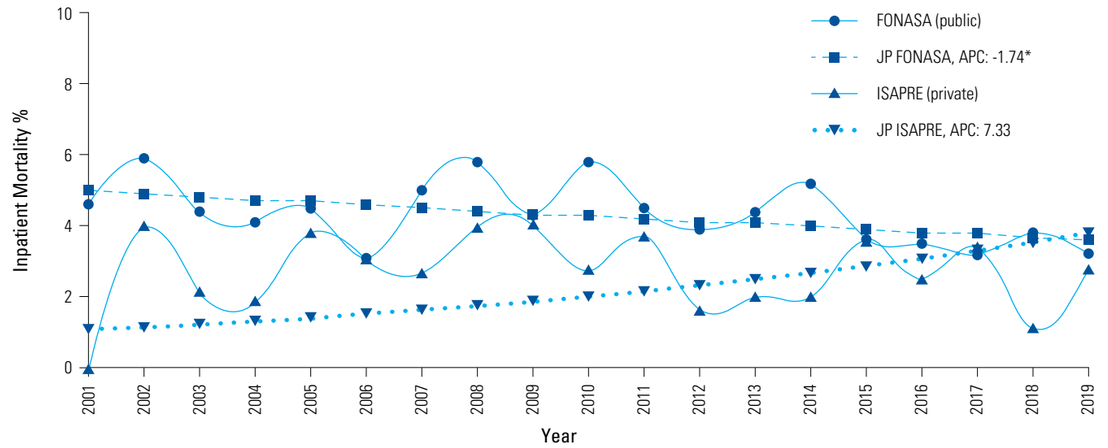
Discussion

To our knowledge, this study provides the first descriptive analysis of the burden of BC-related hospital discharges in Chile, while examining the impact of medical insurance and public policies such as the GES program. Furthermore, we found a significant association between the type of medical insurance and BC clinical outcomes. Most Chileans are enrolled in FONASA (public medical insurance), and only a fraction uses private health coverage (ISAPRE). However, the number of ISAPRE users has progressively increased in recent years. Our study found that the incorporation of BC into the GES program in 2013 was associated with an increase in the number of hospital discharges and bed-days. We also found a doubling in the number of TURBTs over the 2001–2019 period. While our findings indicate higher mortality rates among FONASA patients, these rates decreased over time, particularly after the incorporation of BC into the GES program, suggesting a positive effect of this public policy.

Patients undergoing BC-related surgery exhibited lower inpatient mortality compared with those without surgery, regardless of their medical insurance. However, our results also highlight the contrasting realities of the public and the private health care systems in Chile. A previous study by Castillo-Laborde et al. showed that FONASA mainly serves the elderly and lower-to-mid–income individuals. The public medical insurance provides coverage for a large proportion of the Chilean population, including a high proportion of women and individuals with a higher prevalence of risk factors [10], which may explain the higher inpatient mortality rates

FIGURE 2.

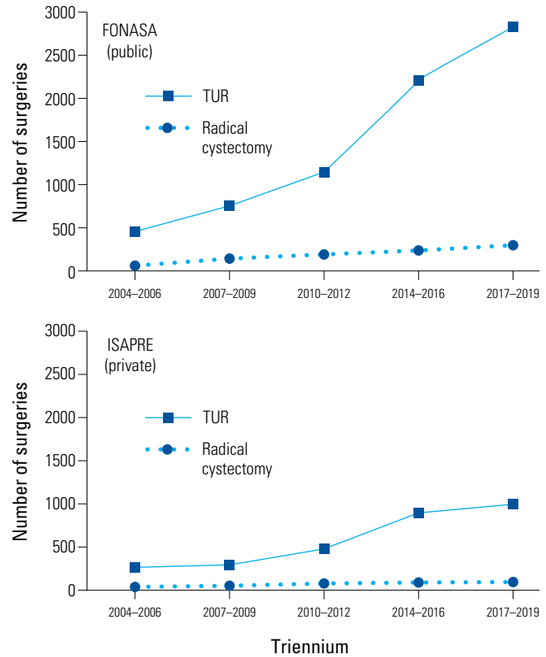
Annual inpatient mortality by medical insurance type during the period of 2001–2019



*P < 0.05. APC: annual percentage change; JP: Joinpoint regression model*P < 0.05. APC: annual percentage change; JP: Joinpoint regression model.

FIGURE 3.

Trends in BC-related surgeries by medical insurance type during the period of 2001–2019.



BC: bladder cancer; TUR: transurethral resection.

TABLE 2.

Mean length of hospital stay (days) by medical insurance type.

	Type of medical insurance	
	FONASA (public)	ISAPRE (private)
Surgery	Mean	Mean
Radical cystectomy	23*	15
TUR	6*	3

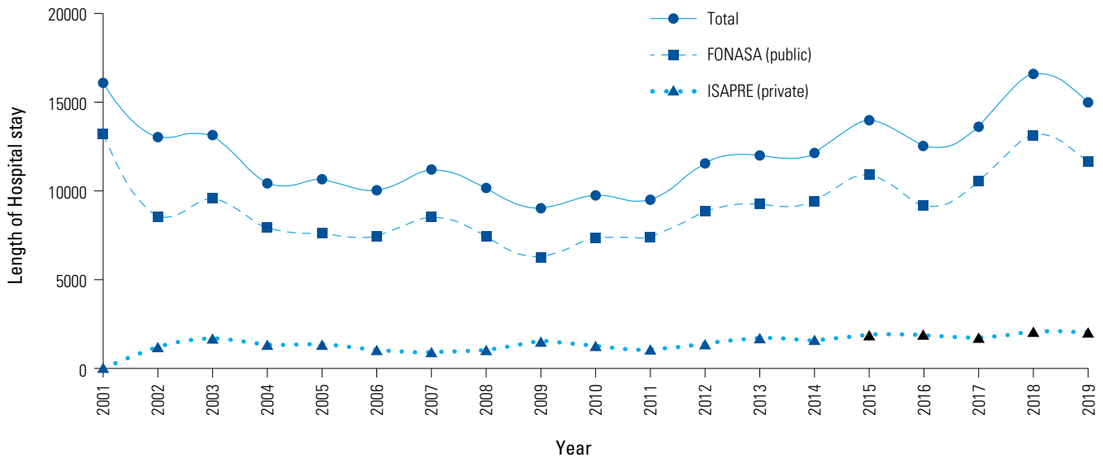
**P < 0.001 by ANOVA (FONASA vs. ISAPRE). TUR: Transurethral resection.*

among FONASA patients observed in our study, regardless of surgery.

Notably, we observed a trend toward lower mortality rates following the incorporation of BC into the GES program in 2013, particularly among FONASA patients. This was accompanied by an increase in the number of TURBTs and a reduction in the proportion of radical cystectomies within the same subset of FONASA patients. These results are aligned with international reports. In 2010, the US Congress approved the expansion of the Medicaid program under the Affordable Care Act (ACA), which delivered health care coverage to

FIGURE 4.

Annual length of hospital stay by medical insurance type during the period of 2001–2019



low-income individuals. Consequently, cancer patients diagnosed after the expansion exhibited 15% less probability of having metastatic disease compared with patients diagnosed before the expansion, suggesting a major impact of health care coverage on the outcomes in low-income communities[14]. Uninsured individuals in the US have been reported to have a 2-fold risk of being diagnosed with metastatic BC and a 60% higher risk of being diagnosed with locally advanced BC compared with individuals enrolled in Medicaid[13].

Regarding inpatient mortality by type of surgery, we observed a marked increase in mortality associated with radical cystectomies in FONASA patients compared with ISAPRE patients, particularly in the period from 2017 to 2019 (2.9% vs. 0.4%). While this difference aligns with the length of stay based on insurance type, it is based on a multifactorial phenomenon that must be further investigated, including more detailed local data. Studies in the US indicate that individuals without health care coverage tend to ignore their symptoms and are less likely to seek medical attention because they mistrust the health system[15]. On the other hand, a lack of social support or means of transportation, along with other cultural behaviors (such as of physicians) further contribute to delayed treatments[16]. Timely treatments and medical care are also affected by the availability of medical providers, especially in remote or rural areas[17]. All these factors contribute to late diagnoses and the emergence of more comorbidities in patients, leading to longer hospital stay and potentially increased inpatient mortality burden.

Another relevant issue to discuss is the cost of BC treatments and management, which impact health care systems. In the US, annual BC-related costs were estimated at approximately US $4000 million in 2010 and projected to reach US $5000 million in 2020[18]. Worldwide studies have consistently reported elevated costs associated with advanced-stage BC mainly because of the aggressive therapies patients undergo. Moreover, non–muscle-invasive tumors usually involve even higher costs due to extended treatments and follow-up schedules[19]. Our study revealed longer hospital stays for FONASA patients who underwent TURBT compared to ISAPRE patients (4 vs. 2 bed-days). Additionally, hospital discharge rates increased over time in both FONASA and ISAPRE patients, imposing a major economic burden on the public system, which accounted for 76.1% of the total discharges during the 2017–2019 period.

It is important to acknowledge the imitations of our study, including potential registration bias leading to missing data for certain variables in our database, such as performance status, other comorbidities, tumor stage, and postoperative care. Approximately 14% of patients did not have registered medical insurance between 2001 and 2019. Additionally, some registries lacked associated IDs, preventing assessment of whether they represented new cases or readmissions of the same patient. Furthermore, we were unable to obtain clinical details for all patients, and some hospital stays may have been misdiagnosed as BC. Finally, our analyses were limited to Chilean patients, making it difficult to extrapolate these findings to other countries. However, these results may reflect the situation of low-income countries within

Latin America, given the presence of similar (mixed) health care systems and comparable socioeconomic conditions.

Conclusions

Our study identified a significant increase in BC-related surgical interventions and admissions over the period from 2001 to 2019. This increase was more pronounced following the incorporation of BC into the GES program, which aimed to ensure access to health care for cancer patients. However, our findings highlight that there are significant differences in the burden BC admissions according to type of medical insurance (public versus private), reflecting a significant disparity in terms of health care. The implementation of public policies such as the GES program may help to reduce this gap between public and private health care systems.

Acknowledgements

Funding statement

This research was funded by ANID Anillo ACT210079.

Author contributions

All authors contributed to the study conception, design, and analysis. Ignacio Eltit and Mario Fernández wrote the first draft of the manuscript and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

References

1. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global Cancer Statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin.*2021;71(3):209–249. doi: 10.3322/caac.21660. PMID: 33538338.

2. Saginala K, Barsouk A, Aluru JS, Rawla P, Padala SA, Barsouk A. Epidemiology of bladder cancer. *Med Sci (Basel).*2020;8(1):15. doi: 10.3390/medsci8010015. PMID: 32183076; PMCID: PMC7151633.

3. Sung JM, Martin JW, Jefferson FA, Sidhom DA, Piranviseh K, Huang M, et al. Racial and socioeconomic disparities in bladder cancer survival: analysis of the California Cancer Registry. *Clin Genitourin Cancer.*2019;17(5):e995–e1002. doi: 10.1016/j.clgc.2019.05.008. PMID: 31239240; PMCID: PMC7821748.

4. Du XL, Lin CC, Johnson NJ, Altekruse S. Effects of individual-level socioeconomic factors on racial disparities in cancer treatment and survival: findings from the National Longitudinal Mortality Study, 1979-2003. *Cancer.*2011;117(14):3242–3251. doi: 10.1002/cncr.25854. PMID: 21264829; PMCID: PMC3090714.

5. Fletcher SA, Cole AP, Lu C, Marchese M, Krimphove MJ, Friedlander DF, et al. The impact of underinsurance on bladder cancer diagnosis, survival, and care delivery for individuals under the age of 65 years. *Cancer.*2020;126(3):496–505. doi: 10.1002/cncr.32562. PMID: 31626340.

6. Morales J, Malles A, Kimble M, de la Vega PR, Castro G, Nieder AM, et al. Does health insurance modify the association between race and cancer-specific survival in patients with urinary bladder malignancy in the U.S.? Int J Environ Res Public Health.2019;16(18):3393. doi: 10.3390/ijerph16183393. PMID: 31540198; PMCID: PMC6765928.

7. Nazemi A, Ghodoussipour S, Pearce S, Bhanvadia S, Daneshmand S. Socioeconomic and insurance status are independent prognostic indicators of higher disease stage and worse prognosis in bladder cancer. *Urol Oncol.*2019;37(10):784–790. doi: 10.1016/j.urolonc.2019.04.021. PMID: 31076355.

8. Terris M, Henao Machado F. Los tres sistemas mundiales de atencion medica. Colombia: Universidad de Antioquia, Facultad Nacional de Salud Publica, 1981.

9. Becerril-Montekio V, Reyes J de D, Manuel A. The health system of Chile. [Article in Spanish] *Salud Publica Mex.*2011;53(Suppl 2):s132–s143. PMID: 21877079.

10. Castillo-Laborde C, Aguilera-Sanhueza X, Hirmas-Adauy M, Matute I, Delgado-Becerra I, Nájera-De Ferrari M, et al. Health insurance scheme performance and effects on health and health inequalities in Chile. *MEDICC Review.* 2017;19(2–3):57–64. Available at: http://www.redalyc.org/articulo.oa?id=437552190010 Accessed June 15, 2023.

11. Ministerio de Salud. Servicios de Salud PAR de G en SL no. 19. 966. (2004). Ley 19966. Published September 3, 2004. Available at: https://www.bcn.cl/leychile/navegar?idNorma=229834 Accessed March 14, 2022.

12. Ministerio de Salud. Decreto N°4 Aprueba Garantías Explícitas en Salud del Régimen General de Garantías en Salud. Published February 22, 2013. Available at: https://www.bcn.cl/leychile/navegar?idNorma=1049111. Accessed March 14, 2022.

13. Kim U, Koroukian S, Statler A, Rose J. The effect of Medicaid expansion among adults from low-income communities on stage at diagnosis in those with screening-amenable cancers. Cancer.2020;126(18):4209–4219. doi: 10.1002/cncr.32895. PMID: 32627180; PMCID: PMC8571714.

14. Clegg LX, Reichman ME, Miller BA, Hankey BF, Singh GK, Lin YD, et al. Impact of socioeconomic status on cancer incidence and stage at diagnosis: selected findings from the surveillance, epidemiology, and end results: National Longitudinal Mortality Study. *Cancer Causes Control.*2009;20(4):417–435. doi: 10.1007/s10552-008-9256-0. PMID: 19002764; PMCID: PMC2711979.

15. Lillie-Blanton M, Brodie M, Rowland D, Altman D, McIntosh M. Race, ethnicity, and the health care system: public perceptions and experiences. Med Care Res Rev.2000;57(Suppl 1):218–235. doi: 10.1177/1077558700057001S10. PMID: 11092164.

16. Neale AV, Tilley BC, Vernon SW. Marital status, delay in seeking treatment and survival from breast cancer. *Soc Sci Med.*1986;23(3)305–312. doi: 10.1016/0277-9536(86)90352-7. PMID: 3764489.

17. Kane GC, Grever MR, Kennedy JI, Kuzma MA, Saltzman AR, Wiernik PH, et al. The anticipated physician shortage: meeting the nation's need for physician services. *Am J Med.*2009;122(12):1156–1162. doi: 10.1016/j.amjmed.2009.07.010. PMID: 19958898.

18. Yeung C, Dinh T, Lee J. The health economics of bladder cancer: an updated review of the published literature. *Pharmacoeconomics.*2014;32(11):1093–1104. doi: 10.1007/s40273-014-0194-2. PMID: 25056838.

19. Sloan FA, Yashkin AP, Akushevich I, Inman BA. The cost to Medicare of bladder cancer care. *Eur Urol Oncol.*2020;3(4):515–522. doi: 10.1016/j.euo.2019.01.015. PMID: 31412015.