

Epidemiology of Interpersonal Physical Violence in Chile: A 20-year Analysis (2003–2022)

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ABSTRACT

Aims and background: Interpersonal violence poses significant health and social challenges. This study examines trends in interpersonal physical violence in Chile from 2003 to 2022.

Materials and methods: Observational cross-sectional study. Data obtained from the Servicio Médico Legal and Departamento de Estadísticas e Información de Salud. Variables analyzed included sex, age, region, type of aggression, and injury. Statistical analysis, using Stata 17, evaluated trends, mortality, and hospital discharge rates (HDR). Ethical committee approval was unnecessary.

Results: Between 2003 and 2022, Chile recorded 75,129 hospital admissions and 14,519 deaths related to physical assaults. While HDR due to assaults (HDRA) showed a decline, a rising trend was seen post-2019. The highest HDRA rates were in the northern area of Chile. Mortality rates decreased overtime and varied by region. Men had higher hospital admissions (91.36%), HDRAs, and mortality, revealing a gender gap. Variations were also noted by age, types of aggression, and trauma. Sharp object assaults were most prevalent, but firearms and blunt objects increased.

Conclusion: Findings suggest a complex landscape of interpersonal physical violence in Chile, with significant regional, gender, and age disparities. While violence incidence is decreasing, severity could be rising, reflected by lethality rates. Gender inequalities in exposure and risk of violence are evident. Changes in aggression types and injuries impact health services readiness and response.

Clinical significance: This study provides information to guide effective intervention policies in Chile, considering trends, geographical differences, gender inequalities, and changes in types of aggression and injuries.

Keywords: Brief violence intervention, Epidemiology, Mortality, Observational study, Violence, Wounds and injuries.

RESUMEN

Objetivos y antecedentes: La violencia interpersonal plantea desafíos significativos para la salud y sociedad. Este estudio examina las tendencias de violencia física interpersonal en Chile de 2003 a 2022.

Materiales y métodos: Estudio transversal observacional. Datos obtenidos del Servicio Médico Legal y del Departamento de Estadísticas e Información de Salud. Variables analizadas incluyeron sexo, edad, región, tipo de agresión y lesión. Análisis estadístico, utilizando Stata 17, evaluó tendencias, tasas de mortalidad y egresos hospitalarios. La aprobación del comité de ética fue innecesaria.

Resultados: Entre 2003 y 2022, Chile registró 75,129 ingresos hospitalarios y 14,519 muertes relacionadas con agresiones físicas. Mientras que las tasas de egreso hospitalario debido a agresiones (HDRA) mostraron un descenso, se observó una tendencia ascendente post-2019. Las tasas más altas de HDRA se encontraban en el área norte. Los hombres tuvieron mayores ingresos hospitalarios (91.36%), HDRA y mortalidad, revelando una brecha de género. También se observaron variaciones según la edad, los tipos de agresión y el trauma. Las agresiones con objetos cortantes fueron las más prevalentes, pero las armas de fuego y objetos contundentes aumentaron.

Conclusión: Los hallazgos sugieren un panorama complejo de violencia física interpersonal en Chile, con disparidades significativas en términos regionales, de género y edad. Si bien la incidencia de la violencia está disminuyendo, la gravedad podría estar aumentando, reflejada en las tasas de letalidad. Las desigualdades de género en la exposición y el riesgo de violencia son evidentes. Los cambios en los tipos de agresión y lesiones impactan en la preparación y respuesta de los servicios de salud.

Significado clínico: Este estudio proporciona información para guiar políticas de intervención efectivas en Chile, considerando tendencias, diferencias geográficas, desigualdades de género y cambios en los tipos de agresión y lesiones.

Palabras claves: Epidemiología, Estudio observacional, Intervención en violencia, Mortalidad, Violencia, Trauma.

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INTRODUCTION

Violence is defined by the “World Report on Violence and Health” as “the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that has a high likelihood of resulting in injury, death, psychological harm, impaired development, or deprivation.”¹ Although this report categorizes violence into physical, sexual, psychological, and deprivation or neglect types, it is important to note that such classifications are not universally accepted.²

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Various risk factors have been identified at the individual, relational, community, and societal levels, ranging from impaired mental health to rapid social changes and deficient laws.³⁻⁵

Globally, 470,000 people are victims of homicide annually, with the Americas having the highest in the world. This evidence suggests that violence is a serious public health problem, not only for its impact on mortality and morbidity but also for its socioeconomic consequences.⁶ Additionally, the global context has seen an increase in interpersonal violence, exacerbated by recent events such as the COVID-19 pandemic.⁷

In the Chilean context, despite the existence of crime statistics, there is a notable absence of epidemiological data on hospital discharges, mortality, and lethality related to physical assaults.⁸ This knowledge gap limits the effectiveness of public policies and intervention strategies.⁹

The objective of this study is to analyze the epidemiology of interpersonal physical violence in Chile from 2003 to 2022. As secondary objectives, hospital stay days, mortality, lethality, as well as the distribution by age and sex, types of assaults, and resulting injuries were evaluated.

MATERIALS AND METHODS

A retrospective cross-sectional observational study was conducted, studying hospital discharges and deaths due to assaults as the underlying cause of death in the period 2003–2022, using the database provided by the National Directorate of the Legal Medical Service (SML) and the Department of Statistics and Health Information (DEIS) to obtain the sample. Data classified with the codes according to the International Statistical Classification of Diseases and Related Health Problems-10 (ICD-10) code X85-Y09, defined as “assaults” were selected.¹⁰ This registry is routine and mandatory for all deaths and hospital discharges that occur in the national territory, both in the public and private systems. For population data, the projections published by the National Institute of Statistics (INE) were used.¹¹ Those discharges or deaths that did not have information on all variables were excluded.

The following characteristics were considered for each deceased—sex, age (grouped in decades), region, date, type of assault, type of injury caused, and place of death. The geographical distribution was addressed by regrouping the regions into three zones—north (regions of Tarapacá, Antofagasta, Arica y Parinacota, and Coquimbo); center (regions of Valparaíso, Libertador Bernardo O’Higgins, Maule and Metropolitan, Biobío and Ñuble); and south (regions of La Araucanía, Los Lagos, Los Ríos, Aysén, Magallanes and Chilean Antarctic).

An exploratory analysis was performed with the raw data. Descriptive statistics were applied to calculate percentages and measure central tendency and variability. Specific mortality rates (SMR) and hospital discharge rates (HDR) were calculated by age and sex, calculated per 100,000 inhabitants at the regional and national levels, and for the temporal study, age-adjusted annual rates (AAR) were estimated, taking as a reference the population estimated by the World Health Organization for the period 2000–2025.¹² The temporal trend was evaluated using a linear regression model, that allows us to estimate the average annual percentage variation (APV), as well as the confidence intervals and associated *p*-values. A *p*-value < 0.05 was determined to determine statistical significance.

To study the geographical variability, the standardized discharge and mortality ratio (SDR and SMR) was determined for each region. Regions with values significantly higher or lower than

Source of support: Nil

Conflict of interest: None

what would be expected at the national level [relative risk (RR)] were identified using 95% confidence intervals (95% CI) for each SMR and SDR.

For data processing, descriptive and statistical analysis, and graph creation, the Stata 17 programs were used. Since the data were open to the public, were anonymized, and were confidential in nature as provided for in law No. 17,374, article 29, it was not necessary to obtain the resolution of an ethics committee.

RESULTS

Hospital Discharges

A total of 75,129 hospital admissions for assaults were identified between 2003 and 2022 in Chile; of these, 68,640 (91.36%) correspond to men. The hospital discharge rate due to assaults (HDRA) was 21.68. The years with the highest rates were 2004, 2007, 2006, and 2020 (with 26.96, 25.00, 24.28, and 23.42, respectively), highlighting a downward tendency during the years until 2019, when an upward tendency begins. The years with the lowest HDRA were 2005 (16.19) and 2016 (17.92) (Fig. 1).

The tendency of hospital in the period 2003–2022 had an APV of -18.2% [CI = -75.03 – -69.24], $p = 0.075$]; which implies that HDRA decreased by 18.2%, however, not significantly.

By region, the ones with the highest average rates were Aysén, Arica y Parinacota, and Antofagasta (with 48.79, 36.56, and 29.21, respectively), and the ones with the lowest were Atacama, Magallanes, and Maule (with 6.36, 7.45, and 9.93, respectively). It was observed that by 2022, the regions with the highest incidence were Arica y Parinacota (36.56), Tarapacá (22.27), and Antofagasta (29.21). Those with the lowest incidence again are Magallanes (7.45), Atacama (6.36), and Maule (9.93) (Table 1).

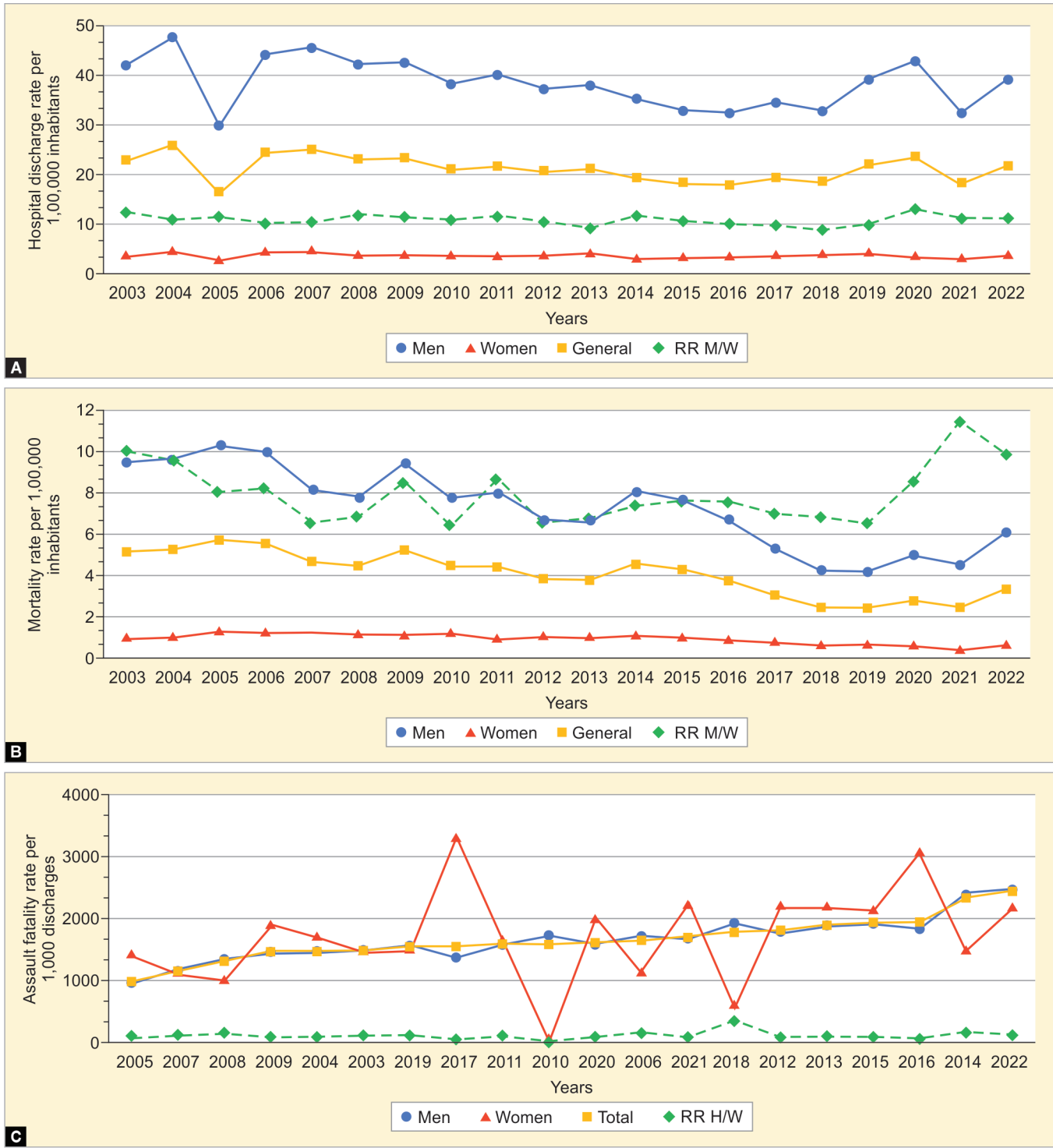
When performing a tendency analysis between regions, Tarapacá and Arica y Parinacota were the ones with the highest APV of 223.68% (CI = 146.69–300.68, $p < 0.01$) and 80.95% (CI = 24.54–137.37, $p < 0.007$), indicating that APV increased significantly each year. The region with the lowest APV was Aysén with -261.38% [CI = -412.41 – -110.35], $p < 0.002$], indicating that HDRA tends to decrease significantly annually (Table 1).

When analyzing the different areas, the south had the highest average HDRA (24.55), and the center had the lowest (17.71). This tendency varies over time, with the north zone having the highest numbers from 2014 to 2021 (Table 1).

The APV was higher in the northern area, which means that as the years go by, the differences in HDRA have increased with an APV of 75.46% (CI = 47.81–103.1, $p < 0.01$). The area with the lowest APV was the south, with a variation of -133.5% [CI = -172.78 – -94.22], $p = 0.01$] (Table 1).

Regarding distribution by sex, men had higher HDRA than women throughout the study period. The highest HDRA for men was 47.92 in 2004, and the lowest was 29.77 in 2005. The highest HDRA for women was 4.39 in 2007, and the lowest was 2.61 in 2005 (Fig. 1).

Women had a higher APV, -2.28% [CI = -6.13 – 1.57 , $p < 0.23$], indicating that HDRA decreased each year, although not significantly. In men, APV was lower, with an APV of -37.86% (CI = 0.96–2.27, $p < 0.046$), with a constant decrease.



Figs 1A to C: Trends in aggressions in Chile during the period 2003–2022. (A) Age-adjusted hospital discharge rates; (B) Age-adjusted mortality rates; (C) Case fatality rate

With regards to HDRA in different age-groups, when calculating an average from 2003 to 2022, it was found that the highest incidence was in the 20–29-year-old group (49.96), the lowest being that of the group of children under 10 years of age (1.59). These differences remained constant throughout the period, with the exception of 2018 when the leading group was 30–39 years old (37.85) (Table 2).

When analyzed by age-groups, it was observed that the group with the highest APV is 30–39 years old, with a 37.69% [CI = (–4.18)–79.57, $p = 0.075$]; a fact that implies a considerable annual increase in HDRA, but not in a significant way. On the other side, the group with the lowest APV was the 20–29-year-old group, with a –93.21% [CI = (–144.7)–(–41.72), $p < 0.001$], which means that there was a significant decrease over time (Table 2).

Table 1: Hospital discharge and mortality rates per 100,000 inhabitants by region and zone in Chile for the period 2003–2022

		Hospital discharge rate due to assaults																				Variation (%)				
Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Mean	SDR	RR	p	
Perzone																										
Arica y Parinacota		47.12	30.57	27.26	32.34	25.67	29.15	28.75	31.60	32.47	32.40	27.55	43.87	33.34	47.02	44.29	35.14	44.93	52.36	37.98	47.34	36.56	29.75	1.37	80.95	0.01
Tarapacá		0.79	0.00	1.14	1.86	30.54	17.77	0.35	36.03	8.30	20.11	24.46	10.57	33.19	36.43	22.80	33.25	38.76	40.76	43.46	44.87	22.27	17.71	0.82	223.67	0.00
Antofagasta		42.15	27.26	20.78	37.63	32.46	31.26	26.50	19.03	21.57	25.77	24.72	26.67	22.15	24.93	28.69	20.77	32.31	44.23	34.53	40.87	29.21	22.72	1.05	18.72	0.54
Atacama		10.13	12.64	1.11	9.85	10.11	5.36	5.66	1.75	3.46	5.48	1.36	8.74	6.00	2.98	6.57	6.82	7.39	9.85	5.05	6.92	6.36	5.38	0.25	7.66	0.55
Coquimbo		2.98	17.18	18.31	43.33	31.44	30.53	27.89	18.53	31.72	31.33	38.76	36.54	26.69	28.58	33.29	26.51	31.88	31.34	25.71	34.00	28.33	22.80	1.05	61.59	0.07
Valparaíso		22.59	29.56	20.88	21.56	21.44	23.37	25.19	24.79	30.62	25.40	21.10	20.06	18.76	13.73	13.63	10.31	11.88	13.67	11.52	11.53	19.58	16.77	0.77	83.25	0.00
Metropolitana		19.22	22.92	10.07	21.23	20.25	17.42	20.43	19.67	20.19	19.32	20.93	17.76	18.92	18.83	23.16	23.29	27.81	29.13	20.56	24.76	20.79	16.03	0.74	37.67	0.01
O'Higgins		18.11	17.80	15.46	16.60	14.79	24.02	24.89	15.99	13.11	10.64	11.51	8.68	9.76	7.85	8.07	7.55	7.76	6.76	9.39	13.77	13.13	10.71	0.49	64.42	0.00
Maule		20.71	18.45	13.64	10.55	11.17	9.36	8.37	6.70	7.71	4.64	5.45	6.25	7.40	10.00	8.05	9.68	10.19	10.42	9.62	10.15	9.93	8.22	0.38	31.62	0.03
Ñuble		30.81	28.69	25.73	34.83	27.56	26.54	25.09	15.50	15.60	9.91	10.88	10.20	9.93	13.48	8.79	10.31	13.78	17.40	14.97	15.28	18.26	15.65	0.72	105.32	0.00
Biobío		19.09	33.87	20.96	33.71	41.25	32.35	29.09	26.77	27.08	26.65	26.80	29.81	20.72	19.42	18.52	15.50	18.61	18.81	14.25	18.14	24.57	21.34	0.98	81.01	0.00
La Araucanía		48.60	39.59	29.69	34.50	34.61	32.57	28.95	21.80	19.34	9.34	19.29	18.25	15.17	11.94	11.76	11.88	13.69	15.97	12.16	12.69	22.09	18.92	0.87	166.00	0.00
Los Ríos		39.13	31.48	23.06	18.97	35.64	35.73	33.69	31.65	28.07	55.53	32.36	22.72	9.65	13.38	13.55	21.45	21.81	24.39	20.11	26.61	26.95	10.65	0.49	76.80	0.06
Los Lagos		29.38	42.55	28.82	30.41	44.02	44.62	43.58	39.05	36.44	31.28	30.88	22.49	22.07	21.31	20.34	16.98	17.86	21.65	18.83	17.51	29.00	53.70	2.48	127.71	0.00
Aysén		102.28	104.55	42.90	71.58	60.66	52.93	37.26	20.95	18.77	54.87	63.25	50.27	48.03	52.53	33.21	39.61	44.06	27.96	30.63	19.44	48.79	41.79	1.93	261.38	0.00
Magallanes y Antártica Chilena		10.44	11.03	7.10	7.69	12.73	8.21	6.26	11.18	4.31	13.42	10.90	4.20	8.34	8.85	4.67	4.03	3.41	6.73	2.78	2.76	7.45	6.19	0.29	35.63	0.00
Perzone																										
North zone		20.64	17.53	13.72	25.00	26.05	22.82	17.83	21.39	19.50	23.02	23.37	25.28	24.27	27.99	27.13	24.50	31.06	35.71	29.35	34.80	24.55	19.67	0.91	75.50	0.00
Center zone		21.75	25.21	17.79	23.08	22.74	22.18	22.18	18.24	19.05	16.09	16.11	15.46	14.25	13.89	13.37	12.77	15.01	16.03	13.38	15.60	17.71	14.79	0.68	54.66	0.00
South zone		45.97	45.84	26.31	32.63	37.53	34.81	29.95	24.92	21.39	32.89	31.34	23.59	20.65	21.60	16.71	18.79	20.17	19.34	16.90	15.80	26.86	26.25	1.21	133.50	0.00
Mortality rate																										
Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Mean	SDM	RR	p	
Perzone																										
Arica y Parinacota		4.05	4.01	4.46	3.43	3.39	4.78	2.83	1.86	4.57	2.25	3.11	2.63	7.79	3.42	4.22	6.20	5.26	6.74	10.18	13.58	4.94	21.73	1.21	29.97	0.00
Tarapacá		6.76	3.89	5.70	4.09	6.18	4.98	6.95	7.48	5.31	3.89	5.72	4.97	7.00	3.88	4.38	3.94	5.96	3.66	11.50	8.07	5.72	22.56	1.40	7.13	0.35
Antofagasta		4.51	3.87	3.81	3.76	4.08	5.12	5.05	7.11	4.56	5.02	3.75	3.52	5.46	6.19	4.81	4.50	4.34	7.08	4.40	9.02	5.00	20.74	1.22	11.16	0.04
Atacama		3.00	2.97	4.79	3.65	2.17	3.57	5.30	1.75	4.15	2.06	3.73	4.71	4.33	2.98	2.63	4.87	2.25	3.81	4.10	5.97	3.64	16.45	0.89	4.81	0.30
Coquimbo		3.77	4.18	6.10	4.06	3.71	3.80	4.31	2.40	1.95	3.83	2.96	2.78	3.25	2.69	4.16	3.10	3.77	5.02	3.89	6.06	3.79	16.03	0.93	0.73	0.87
Valparaíso		3.09	4.16	4.36	3.77	3.91	2.46	2.78	3.44	3.45	2.97	2.16	3.95	3.31	3.17	2.33	3.09	2.38	3.21	2.63	4.76	3.27	14.37	0.80	2.78	0.33
Metropolitana		5.13	5.39	6.61	6.61	5.10	4.83	5.70	4.94	5.03	4.15	4.80	6.11	5.40	4.48	2.85	1.38	1.33	1.64	0.99	1.55	4.20	17.23	1.03	26.10	0.00
O'Higgins		5.88	4.96	5.15	4.74	3.17	4.99	4.70	3.29	5.16	3.55	2.41	2.06	3.54	2.44	3.25	1.97	1.53	1.11	1.30	0.30	3.27	14.02	0.80	24.39	0.00
Maule		7.25	8.55	4.75	5.43	5.79	6.14	6.57	4.54	4.20	4.54	3.06	3.79	3.65	2.96	2.11	2.80	2.50	3.62	3.06	3.12	4.42	19.23	1.08	24.69	0.00
Ñuble		5.90	5.43	4.32	6.45	4.06	3.82	5.06	3.56	3.12	2.07	1.23	2.65	1.42	2.82	3.60	2.38	1.57	1.56	2.72	3.09	3.34	15.18	0.82	19.05	0.00
Biobío		4.15	4.26	4.56	4.93	4.11	3.18	5.02	4.22	4.63	3.34	3.38	4.60	4.08	4.24	4.03	3.46	4.05	5.11	4.37	6.50	4.31	20.01	1.05	2.83	0.34
La Araucanía		8.03	5.03	7.07	6.16	4.30	4.81	4.98	5.27	4.50	3.74	5.16	3.59	3.26	4.55	3.82	3.89	4.76	3.35	2.94	3.32	4.63	21.18	1.13	17.05	0.00
Los Ríos		6.21	7.00	7.51	5.08	6.65	6.62	7.63	6.28	3.64	5.68	3.85	4.34	2.29	2.52	3.76	3.24	3.47	4.19	2.70	3.42	4.80	10.02	1.17	23.73	0.00
Los Lagos		6.38	7.35	6.36	7.95	7.36	5.89	8.05	5.51	5.45	5.03	2.97	4.36	2.69	2.66	2.53	3.31	4.18	3.14	3.79	4.10	4.95	48.47	1.21	25.05	0.00
Aysén		14.92	15.84	10.46	6.22	7.20	8.14	13.09	4.99	9.88	9.80	7.78	4.83	5.76	3.82	4.74	3.77	9.37	4.66	4.64	2.78	7.64	34.62	1.87	46.14	0.00
Magallanes y Antártica Chilena		5.22	5.84	10.32	5.13	4.45	2.53	2.50	4.97	3.69	5.49	3.03	1.80	2.98	1.77	1.75	2.30	2.84	1.12	1.67	1.66	3.55	15.52	0.87	27.08	0.00
Perzone																										
North zone		4.42	3.78	4.97	3.80	3.91	4.45	4.89	4.12	4.11	3.41	3.85	3.72	5.57	3.83	4.04	4.52	4.32	5.26	6.82	8.54	4.62	19.50	1.13	10.77	0.02
Center zone		5.23	5.46	4.96	5.32	4.36	4.24	4.97	4.00	4.26	3.43	2.84	3.86	3.57	3.35	3.03	2.51	2.23	2.71	2.51	3.22	3.80	16.67	0.93	15.70	0.00
South zone		8.15	8.21	8.34	6.11	5.99	5.60	7.25	5.40	5.43	5.95	4.56	3.78	3.39	3.07	3.32	3.30	4.93	3.29	3.15	3.05	5.11	25.96	1.25	27.80	0.00



Table 2: Hospital discharge and mortality rates per 100,000 inhabitants by age-group, for the period 2003–2022

Hospital discharge rate due to assaults																							
Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Mean	Variation (%)	p
0–9	1.10	1.40	1.38	2.09	2.44	1.31	1.02	2.75	2.17	1.64	1.31	1.10	1.01	1.45	1.85	1.17	2.22	2.18	0.81	1.39	1.59	-0.69	0.76
10–19	20.12	22.34	14.21	22.57	25.28	23.39	25.05	21.65	23.43	19.19	19.19	18.07	16.51	14.73	13.65	12.76	15.54	13.31	10.35	14.58	18.30	-56.65	0.00
20–29	56.41	66.74	41.37	59.72	62.22	55.24	59.06	51.86	52.73	51.70	50.69	44.76	40.97	40.36	42.53	37.39	47.32	50.12	39.66	48.43	49.96	-93.21	0.00
30–39	37.15	41.01	24.84	36.38	35.85	33.93	32.09	28.26	32.04	30.55	33.09	30.20	30.42	32.54	36.06	37.85	42.79	47.40	36.31	42.80	35.08	37.69	0.08
40–49	21.05	24.87	15.20	22.60	23.40	23.87	21.94	20.53	18.60	19.37	19.86	20.56	18.72	17.97	19.80	20.41	21.54	27.69	21.70	27.27	21.35	10.37	0.39
50–59	10.50	10.39	7.04	13.66	11.83	11.92	10.27	10.69	9.18	10.28	12.11	10.80	10.85	9.87	12.66	12.37	13.87	14.94	11.62	12.24	11.36	14.47	0.03
60–69	8.04	8.86	5.20	7.75	8.33	7.23	7.42	5.80	5.88	6.31	7.72	5.84	5.46	5.49	5.34	5.67	8.04	7.82	5.44	2.30	6.50	-13.86	0.02
70+	5.11	5.72	4.02	6.00	4.49	3.76	3.54	3.98	4.75	4.16	5.54	3.33	4.24	4.01	4.16	3.78	3.31	3.24	3.16	0.00	4.02	-14.27	0.00

Mortality rate																							
Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Mean	Variation (%)	p
0–9	0.65	0.62	0.47	1.04	0.65	0.65	0.74	0.37	0.45	0.61	0.37	0.37	0.57	0.32	0.24	0.32	0.20	0.24	0.24	0.12	0.46	-3.06	0.00
10–19	3.04	2.95	3.66	3.54	2.91	3.03	4.06	3.48	3.43	3.42	3.21	3.46	3.44	2.54	1.80	1.40	1.20	1.43	1.58	2.49	2.80	-10.24	0.00
20–29	10.88	9.23	10.60	10.68	9.14	9.59	10.56	9.49	8.87	7.15	7.25	9.55	8.82	7.18	5.79	4.81	4.42	5.92	5.38	6.96	8.11	-29.94	0.00
30–39	7.64	8.59	9.28	8.99	7.26	6.54	7.51	6.43	6.92	5.79	6.12	7.53	7.67	6.88	6.08	4.29	4.60	5.15	4.20	5.38	6.64	-20.96	0.00
40–49	6.47	6.65	7.96	6.40	5.21	5.05	6.30	4.86	4.91	4.64	4.82	4.71	4.15	3.92	3.68	2.96	3.15	3.06	2.75	4.71	4.82	-20.54	0.00
50–59	4.41	4.48	4.49	4.85	4.50	3.51	3.93	3.28	3.80	3.16	2.56	4.06	3.09	2.85	1.95	1.96	2.23	2.32	2.17	2.20	3.29	-14.90	0.00
60–69	3.91	5.15	4.00	3.87	3.46	2.89	4.19	3.87	2.82	2.39	1.76	2.67	2.16	2.39	1.62	1.37	1.61	1.39	1.02	1.94	2.72	-17.51	0.00
70+	2.55	4.71	4.24	3.37	3.37	2.37	2.68	2.41	2.51	1.82	1.93	1.71	1.80	2.80	1.75	1.40	1.28	1.30	0.93	1.24	2.31	-14.45	0.00

In relation to the type of aggression, it was identified that between the years 2003 and 2022, there were 53,138 hospital discharges due to aggressions with a sharp object and 13,046 due to firearms. When split-up by sex, it was found that men suffered more frequently from attacks with sharp objects (71.85%), firearms (17.65%), and blunt or dull objects (8.18%). In women, the etiology followed the same order, being 58.92, 14.68, and 9.43%, respectively. When performing a year-by-year analysis, these three continue to be marked over the years. When analyzing the APV of these three types of aggression, it was observed that attacks by firearm were increasing by 3,216.79% [CI = 2,164.51–4,267.07; $p < 0.001$], those by blunt or blunt objects by 1,966.70% [CI = 1,403.94–2,529.45; $p < 0.001$] and those due to sharp objects were decreasing by -4,386.17% [CI = (-6,965.82)–(-1,806.51); $p = 0.002$] (Table 3).

In relation to the type of trauma, it was verified that between 2003 and 2022, there were 23,475 hospital discharges for chest trauma, 18,532 for abdominal and pelvic trauma, and 8,592 for head trauma. When disaggregated by sex, it was found that in men, the most frequent types were chest trauma (25.15%), abdominal and pelvic trauma (32.38%), and head trauma (11.24%). In women, there were abdominal and pelvic trauma (19.59%), chest trauma (19.23%), and head trauma (13.48%). When performing a year-by-year analysis, these three variables continue to be marked over the years. When analyzing the APV of these three types of trauma, it was observed that head trauma increased by 793.99% (CI = 240.72–1,347.25; $p = 0.007$), chest trauma by 659.32% (CI = -573.95–1,892.59; $p = 0.276$) and those of the abdomen and pelvis were decreasing by -2,467.67% [CI = (-3,472.03)–(-1,463.31); $p < 0.001$] (Table 4).

Men are more likely to be hospitalized due to attacks than women (RR 10.86, CI = 10.54–11.09); the difference has been decreasing over time, but not significantly [APV of the RR overtime -3.74%, CI = (-12.21)–4.73, $p < 0.37$].

There are also regional differences in the risk of hospitalization due to attacks. The RR of hospitalization for attacks is higher between the northern and central zones (RR = 1.48, CI = 1.45–1.51)

than between the central and southern zones (RR = 1.05, CI = 1.03–1.07) or between the northern and southern zones (RR = 0.69, CI = 0.67–0.71).

Mortality

A total of 14,519 deaths due to assaults were identified from 2003 to 2022, of which 12,824 corresponded to men. The average mortality rate due to assaults (AMR) in Chile for the period 2003–2022 was 4.09. The years with the highest AMRs were 2005, 2006, and 2009 (5.73, 5.56, and 5.24, respectively). The years with the lowest AMRs were 2018, 2019, and 2021 (2.44, 2.43, and 2.48, respectively) (Fig. 1).

The trend in deaths due to assaults during the period 2003–2022 had an APV of -16.11% [CI = (-20)–(-12,22), $p = 0,001$], which means that HDRAs decreased by 16.12%.

By region, the highest rates on average were Aysén, Tarapacá, and Antofagasta (7.64, 5.72, and 5.00, respectively). The regions with the lowest AMRs were Valparaíso, O'Higgins, and Ñuble (3.27, 3.27, and 3.34, respectively). In 2022, this difference changed, with Arica being identified as the region with the highest AMR (13.58); on the contrary, the regions of O'Higgins, Valparaíso, and Magallanes were those with the lowest AMR during 2022 (0.30, 1.55, and 1.66, respectively) (Table 1).

A trend analysis between regions showed that the regions of Arica and Antofagasta had the highest APV of 29.97%. (CI = 48,67–11,27, $p < 0,001$) y 11,16% (CI = 0,89–21,44, $p < 0,035$), which indicates that the APV increased significantly each year. The region with the lowest APV was Aysén with -46,14% [CI = (-67,98)–(-24,29), $p < 0,001$], noting that AMRs tend to decrease significantly on an annual basis (Table 1).

When analyzing this variable by zones, it was observed that the zone with the highest average AMR was the south (5.22), and the zone with the lowest average AMR was the center (4.08) (Table 1).

The APV was lowest in the southern zone with -27.80%, which means that as the years go by, the AMRs have been decreasing significantly [CI = (-12.05)–(-2.56), $p < 0.005$]. The area with the

Table 3: Number by type of assault and sex considered in hospital discharges and deaths in Chile during the period 2003 and 2022

Type of aggression	Hospital discharge						Mortality					
	Hombres	%	Mujeres	%	Total	%	Hombres	%	Mujeres	%	Total	%
Aggression with sharp object	49,315	71.85	3,823	58.92	53,138	70.73	5,545	90.50	582	9.50	6,127	42.20
Aggression with firearm discharge	12,113	17.65	933	14.38	13,046	17.36	4,712	91.19	455	8.81	5,167	35.59
Aggression by unspecified means	0	0.00	0	0.00	0	0.00	1918	87.02	286	12.98	2,204	15.18
Aggression by hanging, strangulation, and suffocation	62	0.09	31	0.48	93	0.12	180	42.65	242	57.35	422	2.91
Aggression with blunt or dull object	5,613	8.18	612	9.43	6,225	8.29	277	86.83	42	13.17	319	2.20
Other abuse syndromes	0	0.00	0	0.00	0	0.00	28	51.85	26	48.15	54	0.37
Aggression with smoke, fire, and flames	165	0.24	81	1.25	246	0.33	33	56.90	25	43.10	58	0.40
Negligence and abandonment	0	0.00	0	0.00	0	0.00	24	66.67	12	33.33	36	0.25
Aggression by drowning and submersion	8	0.01	4	0.06	12	0.02	24	70.59	10	29.41	34	0.23
Aggression by pushing from a high place	76	0.11	34	0.52	110	0.15	6	60.00	4	40.00	10	0.07
Aggression with bodily force	0	0.00	0	0.00	0	0.00	35	92.11	3	7.89	38	0.26
Aggression by other specified means	0	0.00	0	0.00	0	0.00	31	91.18	3	8.82	34	0.23
Aggression with gases and vapors	52	0.08	20	0.31	72	0.10	1	25.00	3	75.00	4	0.03
Aggression with other specified chemicals and harmful substances	112	0.16	52	0.80	164	0.22	2	66.67	1	33.33	3	0.02
Sexual aggression with bodily force	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	1	0.01
Aggression by motor vehicle collision	377	0.55	165	2.54	542	0.72	4	100.00	0	0.00	4	0.03
Aggression with drugs, medications, and biological substances	295	0.43	444	6.84	739	0.98	1	100.00	0	0.00	1	0.01
Aggression with unspecified chemicals and harmful substances	161	0.23	144	2.22	305	0.41	1	100.00	0	0.00	1	0.01
Aggression with steam, vapors, and hot objects	132	0.19	88	1.36	220	0.29	1	100.00	0	0.00	1	0.01
Aggression with explosive material	26	0.04	8	0.12	34	0.05	1	100.00	0	0.00	1	0.01
Aggression with corrosive substance	41	0.06	26	0.40	67	0.09	0	0.00	0	0.00	0	0.00
Aggression with pesticides	62	0.09	12	0.18	74	0.10	0	0.00	0	0.00	0	0.00
Aggression by pushing or placing the victim in front of a moving object	30	0.04	12	0.18	42	0.06	0	0.00	0	0.00	0	0.00

highest APV is the north, with a variation of 10.77% [CI = (-20.90)–(-9.17), *p* = 0.02] (Table 1).

When contrasting the annual suicide rates by sex, it is observed that the average AARs were always higher in men than in women (7.28 and 0.93, respectively). Men had the highest AMR in 2005 (10.29) and the lowest AMR in 2019 (4.20). Women had the highest AMR in 2005 (1.28) and the lowest in 2021 (0.62) (Fig. 1).

Men have a higher APV of -3.52% [CI = (-4.71)–(-2.33), *p* < 0.001], indicating a significant decrease in AMR each year. In women, the APV is lower -29.43% [CI = (-36.68)–(-22.15), *p* < 0.001], showing a significant decrease throughout the period.

When analyzed by age-group, we observed that the group with the highest VAP is 0–9 years of age with 3.06% [CI = (-4.2)–(-1.91), *p* < 0.001]; this implies a considerable annual decrease in AMR in a significant manner. On the contrary, the group with the lowest APV is the group aged 20–29 years, with -29.94% [CI = (-39.03)–(-20.85), *p* < 0.001], which means that it has been significantly decreasing over time (Table 2).

The RR of 7.95 (CI = 10.54–11.09) implies a higher risk of death from assault in men than in women. This difference has been growing over the years, showing an APV of RR of 0.98% [CI = (-10.78)–12.74, *p* = 0.862], which denotes that the difference between men

Table 4: Frequency by type of trauma and gender considered in hospital discharges and deaths in Chile during the period 2003 and 2022

	Hospital discharge						Mortality					
	Men	%	Women	%	Total	%	Men	%	Women	%	Total	%
Chest trauma	22,227	32.38	1248	19.23	23,475	31.25	7,081	43.96	562	26.40	7,643	41.91
Head trauma	7,717	11.24	875	13.48	8,592	11.44	3,446	21.39	614	28.84	4,060	22.26
Polytrauma	2,218	3.23	214	3.30	2432	3.24	1,879	11.67	203	9.53	2,082	11.42
Abdominal and pelvic trauma	17,261	25.15	1271	19.59	18,532	24.67	1,652	10.26	101	4.74	1,753	9.61
Neck trauma	1,658	2.42	183	2.82	1,841	2.45	876	5.44	207	9.72	1,083	5.94
Other and unspecified effects of external causes	769	1.12	661	10.19	1,430	1.90	308	1.91	353	16.58	661	3.62
Burns and corrosions	581	0.85	352	5.42	933	1.24	36	0.22	26	1.22	62	0.34
Trauma to unspecified part	1,965	2.86	174	2.68	2,139	2.85	441	2.74	51	2.40	492	2.70
Hip and/or lower limb trauma	6,908	10.06	620	9.55	7,528	10.02	304	1.89	7	0.33	311	1.71
Upper limb trauma	7,336	10.69	891	13.73	8,227	10.95	85	0.53	5	0.23	90	0.49

and women has grown overtime, but not significantly, reaching more homogeneous values.

Lethality

There were identified 1,246 inpatient deaths due to assaults between 2003 and 2022 in Chile; of these, 1,136 (91.17%) were men; rates were similar in both sexes (16.52 in men and 16.91 in women per 1,000 discharges). The assault fatality rate (AFR) was 16.56/1,000 hospital discharges. The years with the highest rates were 2022, 2014 and 2016 (with 21.31, 23.26, and 19.30/1,000 discharges, respectively). The years with the lowest AFR were 2005, 2007, and 2008 (with 9.78, 11.49, and 13.09/1,000 discharges, respectively) (Fig. 1).

The trend of hospital admissions for assaults in the period 2003–2022 had an annual percentage change of 35.25% (CI = 12.19–58.31, $p < 0.005$), implying that AFRs increased significantly in the period 2003–2022 (CI = 12.19–58.31, $p < 0.005$).

DISCUSSION

Interpersonal violence in Chile, as in many other countries, is a significant health and social challenge that has ramifications at both individual and community levels. This study sought to fill a critical gap in epidemiological knowledge by examining temporal, geographic, and demographic trends in interpersonal physical violence in Chile during the 2003–2022 period. In doing so, it was intended to provide a solid framework for the formulation of more effective policy and intervention strategies.

One of the most significant findings was the overall decrease in hospital discharges and mortality rates for assaults over the study period. However, it is vital to note that these trends were not always statistically significant. The lack of significance could be attributed to a variety of factors, including a better development of trauma systems. In addition, the 2019–2022 period showed an increase in rates, which could be related to social and economic factors, such as the COVID-19 pandemic.⁷ In the context of measures adopted due to the health emergency, such as the suspension of classes, communal quarantines, teleworking for parents, and social distancing, increased unemployment, worsening mental health, added the stress generated by the possibility of contracting the disease and the economic consequences, additionally it was evidenced an increased the risk of violence against children and

adolescents¹³ and the calls for help in the context of domestic violence increased by 43.8%.¹⁴

It is crucial to understand these peaks in order to implement more effective preventive measures. In addition, the study shows a significant increase in the case fatality rate for assaults in the 2003–2022 period, suggesting that, although the incidence may be decreasing, the severity of cases may be increasing.¹⁴

The fact that men were significantly more likely to be hospitalized and die due to assaults is a troubling finding that highlights gender inequalities in exposure and risk of violence. This aligns with the existing literature, which suggests that men are at greater risk of experiencing physical violence. This phenomenon could be due to ingrained gender norms that encourage more aggressive and risky behaviors among men.¹⁵ Furthermore, although rates among women are lower, they should not be ignored, as they could be underrepresented due to underreporting or outpatient management of such incidents.¹⁶

The study showed significant differences in the incidence of violence between different regions of Chile. These findings are particularly important for public policy formulation, as they suggest that interventions should be geographically specific to address the underlying causes of violence in each region, probably influenced by regional socioeconomic factors, culture, or access to healthcare, especially in the northern zone. Chile has experienced rapid economic development in recent decades, but inequality remains a significant issue. In the northern region, the economy is strongly tied to mining, which can lead to economic and social disparities. These inequalities may contribute to an environment of tension and violence. The northern area of Chile has a unique blend of cultures, including indigenous and migrant communities. These cultural differences can, in some cases, lead to tensions that manifest in forms of violence or aggression. Also, there is a significant increase in crimes with the use of firearms in them. Access to healthcare services in the north may be limited, especially in rural or more isolated areas. This could result in inadequate medical care for victims of aggression, which in turn could contribute to high rates of hospital discharges and mortality. In Chile, public policies surrounding violence and aggression can vary significantly from one region to another. The lack of prevention and support programs in the northern region could be a contributing factor to the high rates observed.^{7–9,12–21}

One of the most revealing aspects of the study is the variability in interpersonal physical violence rates among different age-groups. Specifically, the highest incidence was observed in the 20–29 age-group, while the lowest was in the under-10 age-group. These findings are consistent with existing literature suggesting that violence tends to disproportionately affect young adults, especially those in their most productive years.³ Interestingly, although the 20–29 age-group had the highest incidence of violence, it also showed a significant decline in rates over time. This finding could indicate the success of interventions targeting this group or simply reflect broader demographic or social changes. However, more research is needed to understand these patterns fully.⁴

Changes in the types of assaults and injuries observed during the study period have direct implications for health services preparedness and response. The increase in assaults with firearms and blunt objects, in contrast to a decrease in assaults with sharp objects, suggests that prevention strategies, medical protocols and medical education may need to be adapted to address these changes.¹⁸

Among the limitations of the study is that the data used are collected from records made throughout the country, so there is no standardization for the classification by type beyond ICD-10. In Chile, there are no massified trauma registries or official trauma centers, which would allow a better analysis of the results by visualizing the causes or type of trauma, and thus an improvement in trauma care. This will allow the subsequent creation of a unified trauma registry at the national level with more reliable data than the ICD-10 classification, which, being a secondary source, may underestimate or overestimate the figures, either due to errors in diagnosis or problems in data processing. There is very little literature available on the national experience in trauma registry, and we hope this will be the starting point for further research on the mechanisms of trauma or on the efficacy of management with the current existing protocols.

The results have substantial implications for public policy. Identification of trends over time and geographic differences could guide the allocation of resources for preventive and treatment interventions. In addition, data on gender inequalities and changes in types of assaults and injuries could be crucial for adapting prevention strategies and medical protocols.

Future research could benefit from more robust methods to examine the underlying causes of violence and how these interrelate with social, economic and cultural factors. Qualitative analyses would also be useful to better understand individual experiences and community perspectives.

CONCLUSION

This study provides a comprehensive and updated view of the epidemiology of interpersonal physical violence in Chile, which is invaluable for the formulation of more effective intervention strategies and public policies. However, there is a long way to go to address the complexities and inequalities that characterize violence in the country. Future research and continued policy action are imperative.

Clinical Significance

The study on the epidemiology of interpersonal physical violence in Chile between 2003 and 2022 provides a comprehensive and up-to-date overview of a critical public health and social problem. Its clinical significance is multifaceted. First, the study identifies

temporal and regional trends in assault-related hospitalization, mortality, and case fatality rates. This information is essential for resource planning and intervention strategies in the health system. Second, the study highlights the gender disparity in rates of violence, which could have implications for healthcare and prevention strategies specific to men and women. Third, the increase in the fatality rate suggests that, although the incidence of assaults may be decreasing, the severity of cases is increasing. This is a key indicator for medical professionals, especially in areas such as trauma surgery. Fourth, the study shows significant variations in rates of violence between different regions and age-groups, which may require specific and tailored interventions. Finally, changes in the types of assaults and injuries have direct implications for health service preparedness and response, from emergency care to surgical treatment.

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