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The Impact of Multimorbidity on Capacity and Performance Levels: Insights from a Population-Based Study

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Abstract

Multimorbidity has emerged as a pressing public health concern on a global scale, primarily driven by population aging and the epidemiological transition, which has resulted in an increased prevalence of chronic non-communicable diseases. Objective: The objective of the study was to investigate the functioning profile of individuals with multimorbidity in Chile, focusing on capacity and performance, and to explore the association between multimorbidity and compromised functioning. Methods: Data from the II ENDISC, a cross-sectional population study conducted in Chile in 2015, were analyzed. The sample comprised 12,265 randomly selected individuals aged 17 and above, who were interviewed using the Model Disability Survey. Generalized linear models (GLMs) were employed to assess the impact of multimorbidity on capacity and performance. Results: The results revealed that individuals with multimorbidity presented worse capacity scores (38.31 vs. 19.72) and performance scores (44.51 vs. 27.28) compared to those without multimorbidity. Furthermore, adjusted risk through GLM shows that individuals with multimorbidity had a higher risk of experiencing worse capacity (1.39) and performance (1.29) scores. Gender, self-rated health, age, employment status, and education level were identified as factors associated with varying degrees of impact on functioning. Conclusions: These findings underscore the importance of addressing multimorbidity and its associated factors in healthcare planning and intervention strategies, particularly for socioeconomically vulnerable populations, to enhance well-being and functioning among individuals with multimorbidity.

Keywords: multimorbidity; disability; International Classification of Functioning; Disability and Health; Chile; cross-sectional studies

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1. Introduction

Multimorbidity refers to the simultaneous presence of two or more health conditions within an individual [1,2]. This complex condition has been consistently linked to adverse health outcomes, diminished quality of life (QoL), heightened risk of premature mortality, and escalated healthcare expenditures [3,4]. The prevalence of multimorbidity was estimated to be 42.4% with considerable heterogeneity observed. Notably, its occurrence is more pronounced among older populations and in studies that consider a higher number of baseline conditions [5]. Multimorbidity has emerged as a pressing public health

concern on a global scale, primarily driven by population aging and the epidemiological transition, which has resulted in an increased prevalence of chronic non-communicable diseases [1]. The existing literature consistently highlights the link between multimorbidity and heightened utilization of healthcare services, resulting in escalated costs. Additionally, it is recognized that current healthcare systems are inadequately equipped to effectively address the complexities and consequences associated with multimorbidity, highlighting the need for approaches that also incorporate a more person-centered perspective, to be developed and implemented in primary care and in healthcare systems as a whole [1,6].

Several studies have indicated that socioeconomic factors are closely associated with multimorbidity [7–10]. For instance, individuals with higher income and higher education levels tend to exhibit lower prevalence rates of multimorbidity [4,8]. Furthermore, these socioeconomic factors have been found to have implications for functional capacity and QoL, with reports of adverse impacts [3,11]. In addition to socioeconomic factors, age is a significant factor associated with multimorbidity, as the prevalence of chronic conditions tends to increase with advancing age. Consequently, there is an elevated likelihood of experiencing multimorbidity among older individuals. Furthermore, gender differences have also been observed, with women exhibiting a higher prevalence of multimorbidity [7,12]. It has been demonstrated that the risk of dependency doubles with the onset of one chronic condition, quadruples with the presence of two conditions, and increases thirteenfold with three or more chronic conditions [11,13].

Evidence shows that multimorbidity is associated with greater disability, more functional limitations, and accelerated declines in physical function [14]. Recent longitudinal evidence points out that individuals with multimorbidity experience accelerated declines in physical function and slower recovery during rehabilitation, indicating that impaired physical function both results from and contributes to worsening multimorbidity. Thus, multimorbidity and functional impairment may form a reinforcing cycle in which declining function increases vulnerability to additional conditions and reduces resilience to interventions, thereby amplifying the overall burden of multimorbidity [15]. This impaired physical function, in turn, can contribute to a higher risk of developing additional health conditions [11,13], thereby perpetuating a cycle that amplifies the burden of multimorbidity.

It is crucial to highlight that solely relying on numerical data regarding the prevalence of multimorbidity does not provide a comprehensive understanding of its impact on individual and public health, nor does it shed light on the barriers to accessing healthcare services [4]. Therefore, it becomes essential to utilize additional indicators that offer a broader perspective on the impacts of multimorbidity at both individual and societal levels. Functioning denotes the positive or neutral aspects of the interaction between a person's health condition(s) and that individual's contextual factors (environmental and personal factors) [16] and has been identified as a valuable health indicator that can contribute to healthcare management by providing information on the impact of various health conditions on individuals' lives. Assessing functioning can potentially help address the challenges posed by multimorbidity [17]. Furthermore, the use of functioning indicators appears to bring perspectives on population health not shown by classic indicators such as mortality, morbidity, and others [18]. The aim of this study is to describe the functioning profile of the population with multimorbidity in Chile, focusing on capacity and performance, and to explore whether an association exists between multimorbidity and a compromised functioning profile.

2. Materials and Methods

A cross-sectional study was conducted with data from the population survey conducted in Chile in 2015, the II Estudio Nacional de la Discapacidad (II ENDISC).

2.1. Survey Population

This study utilized data from the II ENDISC, which is a nationally representative household survey conducted in Chile and funded by the Ministry of Social Development and Family. The data collection took place from July 2015 to September 2015, covering both rural and urban areas across all regions of the country. To ensure a statistically representative sample, a total of 17,780 individuals were selected for interviews. Individuals with incomplete or inconsistent data were excluded. For the purposes of this particular study, the analysis focused on individuals aged 18 years or older, resulting in a final sample size of 12,265 participants [19,20].

2.2. Ethical Aspects

Participants of the second National Disability Study (II ENDISC) consented to participate in the national survey conducted by the National Institute of Statistics of Chile, in accordance with the Legal Framework for Statistical Research established by Law No.17.374. [21]. This study used secondary, publicly available, and non-identifiable data, which, according to Resolution No. 510/2016 of the Brazilian National Health Council (CNS), are exempt from review by a Research Ethics Committee in Brazil [22].

2.3. Study Variables

The assessment of functioning in this study was based on performance and capacity, which served as the dependent variables. These variables were measured using scores ranging from 0 to 100, with higher scores indicating worst functioning. The performance and capacity measures were derived from the functioning block of the Model Disability Survey (MDS), which is the instrument utilized in the data collection process. The MDS was developed by the World Health Organization (WHO) and is grounded in the framework of the International Classification of Functioning, Disability and Health (ICF). The primary objectives of the MDS are to provide standardized and comparable estimates of disability prevalence across different countries, to gather data necessary for planning interventions, policies, and programs for individuals with disabilities, and to furnish indicators for monitoring the implementation of recommendations outlined in the Convention on the Rights of Persons with Disabilities. Performance is defined as "performing tasks in the usual environment" and capacity is defined as "performing tasks in a standard environment" [23].

The part of the instrument that collects information on performance asks about: mobility, use of limbs, personal care, vision, hearing, pain, energy and motivation, emotion, interpersonal relationships, stress management, communication, cognition, home life, participation in the community and citizenship, caring for others, work, and study. In the capacity part, there are questions about difficulties in seeing, hearing, communicating without assistance, walking or climbing stairs, concentrating and remembering, getting dressed, performing personal hygiene, handling small objects, sleeping and breathing, being taken care of by another person, participating in social activities, and the presence of feelings such as sadness, discouragement, depression, worry, anxiety, and pain [23].

Multimorbidity was operationalized as the occurrence of self-report of two or more health conditions as already defined in the literature [24]. The MDS list of morbidities is composed of the following diseases: hypertension; diabetes; arthritis/arthritis; heart disease; bronchitis/emphysema; asthma; low back pain; migraine; stroke; depression; anxiety; gastritis/ulcer; chronic kidney disease; skin disease; schizophrenia; bipolar disorder; other rheumatological diseases; and/or Chagas disease. The sociodemographic variables selected for the study were: Region of Chile they resided; sex (male, female); age group (18 to 30 years, 31 to 50 years, 51 to 65 years, >65 years); educational level (no education, basic incomplete, basic complete, medium incomplete, medium complete, superior

incomplete, superior complete) marital status (single, married/stable union, widowed, separated/divorced), work situation (if you worked at least 1 h in the last week); income quintile (V-major, IV, III, II, I-minor) type of housing (house, house with a wall neighbor and roof on 1 side, house with a wall neighbor and roof on 2 sides, apartment in a building with elevator, apartment in a building without elevator, tenement, halfway house, ranch or shack, precarious housing made with recycled materials); how do you classify your health (very good, good, fair, bad, very bad) [20].

2.4. Statistical Analysis

The study population's characteristics were analyzed using frequency distributions with 95% confidence intervals (CI), stratified by the presence or absence of multimorbidity. Performance and capacity means, along with their respective 95%CIs, were presented for the total population as well as subgroups with and without multimorbidity, based on sociodemographic characteristics. The inferential analysis employed Generalized Linear Models (GLMs) (with gamma distribution and a logarithmic link function) with regression to assess the comparison of variables, using arithmetic mean ratios and their respective 95%CIs. Two separate models, one for capacity and one for performance, were constructed. Variables that showed statistical significance in the bivariate analysis were included in the models and subsequently removed gradually, with a significance threshold of $p < 0.20$ for model fit and $p < 0.05$ for overall model significance. The study employed a sampling design that incorporated stratification and weighting. As 135 a result, all analyses were performed using the Svy package in the Stata 11 (STATA Corp., College Station, TX, USA), ensuring the incorporation of appropriate weightings into the analysis process.

3. Results

The sample of the present study consisted of 12,265 people. The results showed a higher frequency of females (25.1%, 95%CI 24.00–26.20), aged 50 to 65 years (13.2%, 95%CI 12.34–14.07), complete secondary education (10.5%, 95%CI 9.72–11.35), married or in a stable union (23.1%, 95%CI 22.04–24.24), who did not work at least one hour in the last week (21.3%, 95%CI 20.25–22.30), with monthly income referring to the II quintile (9.4%, 95%CI 8.69–10.28), living at home (15.0%, 95%CI 14.00–16.03) and who self-assessed their health as regular (19.9%, 95%CI 18.84–20.97). Among the categories studied, those with the highest percentage of people with multimorbidity were older than 65 years (68.4%), without education (60.7%), incomplete basic education (59.6%), widower (71.1%), living on a ranch or cabin (63.9%), without housing information (63.3%) and who considered their health as regular (61.8%), bad (84.1%) or very bad (91.4%). Statistically significant differences were observed across all variables examined when comparing individuals with and without multimorbidity. Detailed information on these findings can be found in Table 1.

The results of the study revealed that in the population of Chile, the female population, over 65 years old, without education, widowed, unemployed, with lower income, living in more precarious housing and who consider their health to be very bad are those who had the lowest mean capacity and performance scores (Tables 2 and 3).

Table 1. Distribution of prevalence of multimorbidity according to study variables (II ENDISC, Chile, 2015).

Variables	Multimorbidity					(%)	95% CIs	Total	
	No		Yes		$p < 0.05$				
	n	%	n	%	*			n	%
Region									
Taparacá	154	64.0	97	36.1		0.6	0.51–0.82	251	1.8
Antofogasta	343	76.3	129	23.7		0.7	0.58–0.92	472	3.1
Atacama	187	64.2	115	35.8		0.5	0.44–0.68	299	1.5
Coquimbo	342	63.8	206	36.2		1.5	1.34–1.77	548	4.3
Valparaiso	846	62.1	588	37.9		4.0	3.58–4.44	1434	10.5
O'Higgins	331	58.7	248	41.3		2.1	1.81–2.55	579	5.2
Maule	496	71.5	224	28.5		1.7	1.40–2.02	720	5.9
Biobio	910	57.1	730	42.8		5.1	4.55–5.66	1640	11.8
La Araucanía	379	56.4	309	43.5		2.4	2.13–2.77	688	5.6
Los Lagos	296	59.6	225	40.4		2.0	1.64–2.36	521	4.8
Aysen	178	66.0	97	34.0		0.2	0.15–0.23	275	0.6
Magallanes y La A.C	151	60.0	102	40.0		0.3	0.25–0.45	253	0.8
Metropolitana	2157	57.8	1687	42.2		17.2	15.94–18.52	3844	40.8
Los Rios	231	57.8	183	42.2		0.9	0.71–1.14	414	2.1
Arica y Parinacota	203	65.1	115	34.9		0.3	0.25–0.40	318	0.9
Total	7201	60.2	5055	39.8		39.8	38.45–41.10	12256	100
Sex					*				
Male	3638	69.6	1664	30.4		14.68	13.81–15.59	5302	48.3
Female	3563	51.5	3391	48.5		25.1	24.00–26.20	6954	51.7
Age groups (Years)					*				
18 to 30	2112	83.1	456	16.8		4.2	3.71–4.75	2568	24.9
31 to 50	2841	67.2	1320	31.8		11.0	10.15–11.84	4161	33.5
51 to 65	1467	47.0	1633	52.9		13.2	12.34–14.07	3100	24.8
>65	781	31.6	1646	68.4		11.4	10.62–12.24	2427	16.8
Educational level					*				
Without formal	137	39.3	200	60.7		1.5	1.26–1.86	337	2.5
Incomplete fundamental	783	40.4	1120	59.6		8.2	7.50–8.89	1903	13.7
Complete fundamental	689	48.7	725	51.3		5.7	5.07–6.34	1414	11.1
Incomplete intermediate	958	57.9	800	42.1		5.9	5.40–6.56	1758	14.1
Complete intermediate	2138	62.5	1270	37.5		10.5	9.72–11.35	3408	28.0
Incomplete superior	983	77.1	310	22.9		2.9	2.49–3.37	1293	12.7
Complete superior	1512	71.9	626	28.1		5.0	4.39–5.69	2138	17.8
Marital status					*				
Single	2653	74.7	1101	25.2		8.2	7.49–8.97	3754	30.6
Married/Cohabiting	3580	56.6	2522	43.3		23.1	22.04–24.24	6102	49.8
Widowed	373	28.9	838	71.1		5.0	5.45–5.53	1211	10
Separated/Divorced	595	51.5	594	48.5		3.4	3.03–3.87	1189	9.6
Work situation—Worked at least 1 h in the last week					*				
No	2766	52.1	2860	47.9		21.3	20.25–22.30	5626	44.4
Yes	4435	66.7	2195	33.3		18.5	17.43–19.63	6630	55.6
Income (quintiles)					*				
V (Best)	1474	68.5	724	31.5		5.7	5.09–6.44	2198	18.2
IV	1461	63.2	946	36.8		7.6	7.00–8.34	2407	20.8
III	1446	59.3	1059	40.7		8.6	7.93–9.39	2505	21.2
II	1400	54.7	1158	45.3		9.4	8.69–10.28	2558	20.9
I (Worse)	1420	56.1	1168	43.9		8.3	7 65–8.98	2588	18.9
Housing					*				
House	2815	60.6	2030	39.4		15.0	14.00–16.03	4845	38.0
Semi-detached house on one side	2196	57.2	1642	42.7		14.0	13.01–15.16	3838	32.8
Semi-detached house on both sides	1141	63.7	689	36.3		5.2	4.58–5.84	1830	14.2
Apartment in building with elevator	310	66.0	162	33.9		1.7	1.28–2.38	472	5.2
Apartment without elevator	624	62.5	423	37.8		3.1	2.49–3.83	1047	8.2
Dwelling room	24	52.5	17	47.5		0.2	0.09–0.34	41	0.4
Half-roof house	72	53.2	69	46.8		0.4	0.24–0.55	141	0.8
Hut	1	36.1	2	63.9		0.0	0.00–0.02	3	0.0
Precarious housing with reused material	7	56.1	6	43.9		0.0	0.01–0.13	13	0.1
No data	11	35.6	5	63.3		0.1	0.05–0.21	26	0.2
Health conditions					*				
Very good health	1385	89.2	146	10.8		1.5	1.11–1.98	1531	13.7
Good health	4076	74.7	1457	25.3		11.7	10.80–12.62	5533	46.2
Regular health	1592	38.2	2616	61.8		19.9	18.94–20.97	4208	32.6
Bad health	125	15.8	697	84.1		5.6	4.96–6.24	822	6.6
Very bad health	17	8.6	138	91.4		1.1	0.85–1.36	155	1.2
No data	6	69.7	1	30.3		0.0	0.00–0 12	7	0.0

* $p < 0.05$; 95% CIs: 95% confidence intervals.

Table 2. Distribution of means of capacity according to study variables (II ENDISC, Chile, 2015).

Variables	Multimorbidity				Total	
	No		Yes			
	Mean	95% CIs	Mean	95% CIs	Mean	95% CIs
Region						
Taparacá	20.3	14.81–25.87	35.1	31.46–38.68	25.7	21.75–29.57
Antofogasta	17.6	15.59–19.71	33.0	30.50–35.57	21.3	19.60–23.00
Atacama	21.3	19.32–23.23	43.4	40.82–45.90	29.2	27.05–31.34
Coquimbo	20.1	18.60–21.71	40.9	37.96–43.81	27.6	25.71–29.59
Valparaiso	20.5	19.26–21.66	38.6	37.04–40.13	27.4	26.28–28.44
O'Higgins	19.7	17.72–21.65	39.7	37.69–41.79	28.0	26.21–29.84
Maule	21.8	20.03–23.68	40.5	38.16–42.78	27.2	25.60–28.73
Biobio	18.5	17.31–19.79	38.5	36.98–40.10	27.1	25.91–28.36
La Araucanía	19.7	17.91–21.60	36.9	35.02–38.78	27.2	25.49–28.95
Los Lagos	20.8	18.82–22.78	37.2	35.53–38.94	27.4	25.56–29.32
Aysen	18.2	16.07–20.40	35.9	31.90–39.99	24.2	22.55–25.96
Magallanes y La A.C	22.0	18.56–25.41	39.9	35.62–44.13	29.1	25.83–32.45
Metropolitana	19.0	18.21–19.75	37.8	36.50–39.05	26.9	26.07–27.78
Los Rios	22.8	20.45–25.10	41.4	38.77–44.06	30.6	28.04–33.24
Arica y Parinacota	28.7	26.07–31.42	45.1	40.07–50.20	34.5	32.99–35.94
Sex						
Male	18.1	17.79–18.67	36.7	35.65–37.74	23.7	23.11–24.39
Female	21.8	21.07–22.51	39.3	38.51- 40.01	30.3	29.67–30.91
Age groups (Years)						
18 to 30	16.4	15.64–17.24	32.2	30.20–34.29	19.1	18.32–19.90
31 to 50	18.5	17.70–19.25	34.6	33.57–35.68	23.8	23.04–24.50
51 to 65	23.7	22.71–24.71	39.0	37.91–40.03	31.8	30.99–32.66
>65	29.1	27.53–30.60	43.3	42.23–44.43	38.8	37.88–39.80
Educational level						
Without formal	38.2	33.93–42.48	50.7	47.64–53.79	48.8	43.33–48.26
Incomplete fundamental	25.4	23.95–26.89	41.7	40.39–43.06	35.2	34.09–36.26
Complete fundamental	22.7	21.16–24.33	40.0	38.49–41.51	31.6	30.21–32.98
Incomplete intermediate	20.5	19.26–21.85	38.3	36.86–39.80	28.1	27.00–29.17
Complete intermediate	19.1	18.24–19.94	36.1	35.08–37.07	25.5	24.72–26.21
Incomplete superior	17.1	16.06–18.17	34.6	32.29–36.95	21.1	20.00–22.25
Complete superior	16.9	15.97–17.76	33.8	32.12–35.56	21.6	20.70–22.56
Marital status						
Single	18.1	17.32–18.93	35.9	34.39–37.48	22.6	21.86–23.42
Married/Cohabiting	19.8	19.20–20.47	37.6	36.81–38.39	27.5	26.96–28.13
Widowed	29.7	27.46–31.93	44.5	43.04–45.97	40.2	38.90–41.61
Separated/Divorced	23.8	22.22–25.45	39.7	38.08–41.43	31.6	30.20–32.92
Work situation—Worked at least 1 h in the last week						
No	22.2	21.38–23.00	42.1	41.33–42.95	31.8	31.06–32.48
Yes	18.2	19.62–18.75	33.9	33.04–34.77	23.4	22.87–23.99
Income (quintiles)						
V (Best)	17.8	16.67–18.84	33.1	31.20–34.96	22.6	29.00–30.87
IV	19.0	18.01–19.93	37.3	36.15–38.56	25.7	29.06–30.99
III	19.0	18.03–19.96	38.7	37.50–39.85	27.0	26.07–28.01
II	21.4	20.42–22.46	40.7	39.15–41.57	30.0	24.86–26.63
I (Worse)	22.0	20.77–23.15	40.1	38.97–41.22	29.9	21.58–23.57
Housing						
House	19.9	19.23–20.66	38.1	36.95–39.22	27.1	26.37–27.87
Semi-detached house on one side	19.7	18.90–20.45	38.9	37.85–40.00	27.9	27.15–28.67
Semi-detached house on both sides	20.6	19.44–21.80	40.0	38.36–41.40	27.6	26.57–28.67
Apartment in building with elevator	17.5	15.30–19.78	33.5	30.62–36.46	23.0	20.93–25.01
Apartment without elevator	19.0	17.20–20.84	37.1	34.87–39.40	25.8	23.99–27.71
Dwelling room	21.0	16.74–25.35	27.8	22.14–33.45	24.2	21.12–27.38
Half-roof house	16.2	11.19–21.26	36.3	31.63–41.03	25.6	21.15–30.13
Hut	0.2		51.1	46.54–55.73	32.7	2.78–62.70
Precarious housing with reused material	19.2	3.91–34.45	52.7	49.11–56.40	33.9	19.76–48.08
No data	17.6	5.09–30.05	44.4	38.22–50.61	35.7	26.93–44.48
Health conditions						
Very good health	11.3	10.44–12.09	23.1	18.32–27.84	12.5	11.61–13.48
Good health	18.0	17.76–18.52	31.0	29.76–31.79	21.2	20.73–21.73
Regular health	30.6	29.63–31.52	39.2	38.57–39.94	36.0	35.36–36.55
Bad health	43.2	40.45–45.98	51.2	50.09–52.32	50.0	48.92–51.01
Very bad health	62.2	54.88–69.52	57.0	54.51–59.25	57.3	55.10–59.57
No data	30.1	14.53–45.66	48.8		35.8	21.92–46.91

95% CIs: 95% confidence intervals.

Table 3. Distribution of performance means according to study variables (II ENDISC, Chile, 2015).

Variables	Multimorbidity				Total	
	No		Yes			
	Mean	95% CIs	Mean	95% CIs	Mean	95% CIs
Region						
Taparacá	28.7	24.28–33.14	43.1	40.36–45.86	33.9	30.96–36.86
Antofogasta	23.4	20.97–25.89	40.3	37.92–42.69	27.4	25.01–29.84
Atacama	28.9	26.59–31.26	48.2	46.72–49.68	35.8	33.86–37.80
Coquimbo	29.1	27.49–30.76	46.8	44.61–48.91	35.5	33.72–37.30
Valparaiso	27.6	26.20–29.07	43.2	41.74–44.80	33.6	32.32–34.83
O'higgins	23.1	20.80–25.32	43.5	41.39–45.63	31.5	29.53–33.55
Maule	30.0	28.05–31.95	47.9	46.20–49.61	35.1	33.41–36.80
Biobio	26.9	25.31–28.50	44.8	43.65–45.98	34.6	33.37–35.81
La Araucanía	28.6	26.37–30.88	43.9	41.98–45.83	35.3	33.41–37.15
Los Lagos	31.4	29.39–33.48	44.9	42.98–45.83	36.9	35.22–37.15
Aysen	25.8	23.06–28.50	42.2	39.22–45.21	31.4	29.21–33.52
Magallanes y La A.C	30.8	27.47–34.23	47.2	44.34–50.11	37.4	34.18–40.57
Metropolitana	26.3	25.95–27.31	44.4	43.39–45.35	33.9	32.99–34.89
Los Rios	30.2	27.79–32.63	44.8	42.56–47.12	36.4	34.35–38.41
Arica y Parinacota	34.2	31.81–36.68	47.0	43.85–50.11	38.7	37.40–39.98
Sex						
Male	25.7	24.96–26.43	43.2	42.36–44.09	31.0	30.35–31.72
Female	29.3	28.50–30.05	45.3	44.67–45.87	37.0	36.45–37.65
Age groups (Years)						
18 to 30	24.7	23.74–25.70	41.1	39.31–42.85	27.5	26.57–29.39
31 to 50	26.7	25.82–27.52	42.6	41.73–43.48	31.9	31.14–32.65
51 to 65	29.4	28.19–30.68	44.6	43.70–45.49	37.5	36.53–38.40
>65	35.1	33.54–36.72	47.5	46.67–48.39	43.6	42.78–44.45
Educational level						
Without formal	42.1	39.08–45.15	52.6	50.21–55.05	48.5	46.50–50.49
Incomplete fundamental	33.9	32.43–35.42	47.2	45.92–48.45	41.8	40.84–42.82
Complete fundamental	29.9	28.32–31.56	45.3	44.06–46.53	37.8	36.59–39.05
Incomplete intermediate	29.0	27.77–30.18	44.8	43.65–45.99	35.7	34.71–36.66
Complete intermediate	26.4	25.40–27.35	42.9	42.03–43.79	32.6	31.75–33.40
Incomplete superior	25.4	23.87–26.85	41.7	39.85–43.58	29.1	27.10–30.51
Complete superior	23.8	22.62–24.91	41.4	40.08–42.73	28.7	27.64–29.79
Marital status						
Single	25.8	24.86–26.72	43.1	41.79–44.38	30.2	29.36–30.99
Married/Cohabiting	27.5	26.75–28.22	43.8	43.16–44.49	34.6	33.96–35.19
Widowed	35.9	33.78–38.08	48.6	47.59–49.72	45.0	43.92–46.06
Separated/Divorced	30.7	28.82–32.49	46.5	45.32–47.71	38.3	37.01–39.69
Work situation—Worked at least 1 h in the last week						
No	29.7	28.88–30.60	46.8	46.17–47.53	37.9	37.27–38.63
Yes	25.7	25.07–26.41	41.8	41.11–42.55	31.1	30.50–31.72
Income (quintiles)						
V (Best)	24.2	22.96–25.41	40.2	38.56–41.88	29.2	28.10–30.36
IV	26.5	25.29–27.74	43.4	42.27–44.59	32.7	31.73–33.75
III	27.0	25.90–28.16	44.8	43.80–45.79	34.3	33.30–35.27
II	29.4	28.31–30.48	46.0	45.07–46.86	36.9	36.04–37.78
I (Worse)	29.9	28.63–31.13	46.5	45.75–47.32	37.2	36.29–38.11
Housing						
House	27.9	26.97–28.76	44.2	43.22–45.10	34.3	33.54–35.07
Semi-detached house on one side	27.2	26.13–28.23	45.0	44.22–45.77	34.8	33.94–35.66
Semi-detached house on both sides	27.5	26.35–28.75	45.7	44.66–46.80	34.2	33.14–35.18
Apartment in building with elevator	24.6	22.00–27.27	40.3	37.87–42.78	30.0	27.58–32.34
Apartment without elevator	26.7	24.71–28.61	44.4	42.58–46.18	33.3	31.46–35.21
Dwelling room	30.0	24.94–35.00	38.1	33.98–42.21	33.8	30.38–37.27
Half-roof house	22.6	16.48–28.69	44.6	42.67–46.65	32.9	27.94–37.90
Hut	31.0		49.5	38.02–60.94	42.8	28.58–57.03
Precarious housing with reused material	23.3	5.38–41.14	57.1	52.23–62.00	38.1	22.75–53.49
No data	21.1	7.28–34.94	49.7	44.48–54.89	40.2	31.15–49.21
Health conditions						
Very good health	17.1	15.95–18.25	32.6	28.31–36.97	18.8	17.55–20.02
Good health	25.8	25.17–26.45	37.9	36.93–38.81	28.9	28.30–29.43
Regular health	39.5	38.65–40.28	45.8	45.37–46.34	43.4	42.95–43.89
Bad health	47.8	45.09–50.48	54.0	53.08–54.85	53.0	52.09–53.90
Very bad health	61.7	55.84–67.62	59.2	57.81–60.60	59.4	58.07–60.77
No data	30.2	18.10–42.22	46.0		35.0	24.12–45.82

95% CIs: 95% confidence intervals.

Table 2 reveals that, in terms of capacity, the population with multimorbidity consistently exhibits poorer results (38.3 (37.65–38.97)) compared to those without multimorbidity (19.7 (19.27–20.17)). Notably, individuals without multimorbidity who self-assessed their health as "very bad" displayed a higher mean capacity (62.2, 95%CI 54.88–69.52) than those

with multimorbidity (57.0, 95%CI 54.51–59.25). Additionally, specific subgroups within the population with multimorbidity demonstrated particularly low-capacity scores. These include individuals residing in the Arica and Parinacota region (45.1, 95%CI 40.07–50.20) and Los Ríos (41.4, 95%CI 38.77–44.06), women (39.3, 95%CI 38.51–40.01), widowed individuals (44.5, 95%CI 43.04–45.97), those who are separated/divorced (39.7, 95%CI 38.08–41.43), unemployed individuals (42.1, 95%CI 41.33–42.95), those in the lower income quintile (quintile II: 40.4, 95%CI 39.15–41.57), individuals living in ranches or cabins (51.1, 95%CI 46.54–55.73) or in basic housing (52.8, 95%CI 49.11–56.40), and those who perceive their health as very bad (56.9, 95%CI 54.51–59.25). Moreover, age was found to be inversely associated with capacity, with higher age corresponding to lower capacity scores. Similarly, lower education levels were associated with poorer capacity outcomes. These findings underscore the disparities in capacity among different subgroups and highlight the associations of age and education on functional capabilities.

Table 3 displays the performance results, revealing that individuals with multimorbidity demonstrated higher mean performance values (44.5 (43.98–45.05)) compared to those without multimorbidity (27.3 (26.73–27.82). Among the population with multimorbidity, certain subgroups exhibited lower performance scores. Notably, residents of the Atacama region (48.2, 95%CI 46.72–49.68) and Maule (47.9, 95%CI 46.20–49.61) had the lowest performance scores. Similar patterns were observed for women (45.3, 95%CI 44.67–45.87), widowed individuals (48.6, 95%CI 47.59–49.72), those who were separated/divorced (46.5, 95%CI 45.32–47.71), unemployed individuals (46.8, 95%CI 46.17–47.53), individuals in the lowest income quintile (quintile I: 46.3, 95%CI 45.75–47.32), individuals living in ranches or cabins (49.5, 95%CI 38.02–60.94) or in lodgings (57.1, 95%CI 52.23–62.00), and those who rated their health as very bad (59.2, 95%CI 57.81–60.60). Additionally, as observed in capacity, higher age and lower education levels were associated with poorer performance outcomes. These findings highlight the variations in performance across different subgroups and emphasize the association of age and education on functional performance.

GLM regression models revealed that individuals with multimorbidity were more likely to have worse capacity scores (1.4, 95%CI 1.34–1.42) and worse performance scores (1.3, 95%CI 1.26–1.32). Women also had a higher risk of experiencing worse capacity scores (1.1, 95%CI 1.07–1.15) and worse performance scores (1.1, 95%CI 1.04–1.10) compared to men. Additionally, individuals with poorer self-rated health had a higher risk of worse capacity (Good: 1.5, 95%CI 1.44–1.66; Fair: 2.2, 95%CI 2.09–2.41; Poor: 2.7, 95%CI 2.52–2.93; Very poor: 3.0, 95%CI 2.77–3.31) and performance (Good: 1.4, 95%CI 1.36–1.55; Fair: 2.0, 95%CI 1.81–2.09; Poor: 2.2, 95%CI 2.04–2.33; Very poor: 2.4, 95%CI 2.22–2.55). Increasing age was associated with worse capacity scores (>30 to 50 years: 1.1, 95%CI 1.05–1.17; >50 to 65 years: 1.3, 95%CI 1.22–1.36; >65 years: 1.4, 95%CI 1.30–1.45) and worse performance scores (>30 to 50 years: 1.1, 95%CI 1.01–1.09; >50 to 65 years: 1.1, 95%CI 1.03 to 1.12; >65 years: 1.1, 95%CI 1.09 to 1.20). Being employed was associated with better capacity scores (0.9, 95%CI 0.90 to 0.97). Furthermore, higher levels of education were associated with better capacity scores 201 (Basic incomplete: 0.8, 95%CI 0.72 to 0.86; Elementary complete: 0.8, 95%CI 0.70 to 0.74; Middle incomplete: 0.8, 95%CI 0.73 to 0.89; Middle complete: 0.7, 95%CI 0.97 to 0.81; Superior incomplete: 0.8, 95%CI 0.72 to 0.88; Superior complete: 0.75, 95%CI 0.68 to 0.83) and better performance scores (Basic incomplete: 0.9, 95%CI 0.83 to 0.95; Basic complete: 0.8, 95%CI 0.79 to 0.92; Average incomplete: 0.9, 95%CI 0.83 to 0.96; Average complete: 0.8, 95%CI 0.77 to 0.89; Superior incomplete: 0.9, 95%CI 0.81 to 0.95; Superior complete: 0.8, 95%CI 0.78 to 0.91). Thus, individuals with multimorbidity were more likely to have worse capacity and performance scores, while factors such as gender, self-rated health, age, employment status, and education level were also associated with differences in functioning.

4. Discussion

The findings of this study revealed higher prevalence rates of multimorbidity among specific subgroups of the Chilean population, including females, individuals aged 50 years or older, those with lower education levels, widowed individuals, residents of rural areas or with missing housing information, individuals with lower income, unemployed individuals, and those who rated their health as regular, bad, or very bad. Additionally, individuals with multimorbidity were found to have poorer levels of capacity and performance, that is, a greater degree of disability.

When examining the outcomes of studies conducted in other countries aiming to analyze population profiles associated with a higher prevalence of multimorbidity, it is noteworthy that they exhibit comparable findings to those observed in the present study [2,8,9]. For instance, a study conducted in Brazil revealed that women, the elderly, individuals living with a partner, those with lower educational attainment, and those from lower socioeconomic backgrounds exhibited the highest prevalence of multimorbidity [10]. These consistent findings across different populations support the notion that certain demographic and socioeconomic factors are associated with a higher prevalence of multimorbidity.

The existing literature consistently demonstrates a correlation between unfavorable socioeconomic variables and an increased likelihood of experiencing multimorbidity. Specifically, individuals with lower levels of education and those residing in socioeconomically disadvantaged areas have a respective 64% and 42% higher chance of developing multimorbidity [10,12]. Furthermore, individuals with low income face a 3.4-fold higher risk of developing multimorbidity [12]. Other factors such as low socioeconomic status, female gender, and advancing age have also been identified as associated with multimorbidity [11]. The findings of the present study align with the current body of literature by indicating that individuals with greater social vulnerability exhibit a higher prevalence of multimorbidity. These findings underscore the importance of considering social determinants of health when developing prevention and healthcare strategies for individuals with multimorbidity.

Individuals with multimorbidity exhibited lower capacity and performance, indicating a higher degree of disability, which aligns with the findings reported in the literature. Multimorbidity is associated with increased levels of disability, functional decline, reduced QoL, and heightened healthcare costs [11]. It is worth noting that data from the World Health Survey indicate a positive trend towards improved functioning in the general population. However, the prevalence of chronic diseases appears to be on the rise, which can have a negative impact on overall functioning [25,26]. Chronic conditions such as hypertension, arthrosis/arthritis, respiratory diseases, low back pain, and dementia are particularly linked to higher levels of disability, often influenced by behavioral risk factors such as physical inactivity [27–30]. Consequently, an increase in the prevalence of chronic diseases may be associated with a decline in population functioning.

Among individuals with multimorbidity, being female, aging, and having a poorer health classification were associated with lower levels of capacity and performance. Conversely, higher education was associated with better capacity and performance outcomes. Additionally, being employed is found to be a protective factor for mean capacity scores. Existing literature has already highlighted that in the general adult population, factors such as female gender, aging, low education, low income, and the presence of certain health conditions have a negative impact on capacity and performance values [31]. Thus, it is evident that the risk pattern for poorer capacity and performance values in the multimorbidity population mirrors that of the general population. This highlights the importance of considering social policies alongside health-focused programs to improve overall well-being, considering the influence of personal and environmental factors on functioning.

Furthermore, there is a need for a more comprehensive examination of women and the elderly to understand how to enhance their QoL and mitigate the impacts on functioning.

This research has limitations, including the use of secondary data, reliance on self-reported data for the presence of health conditions, exclusion of residents in long-stay institutions and hospitals, as well as potential biases related to memory and survival. However, it is important to acknowledge that the data on capacity and performance were self-reported by the participants, providing a subjective perception of their own condition and considering their individual limitations and abilities. Since no other studies have been identified, the use of the theoretical framework of functioning, as recommended by the World Health Organization, to investigate the health of people with multimorbidity at the population level adds strength and value to this study. Furthermore, the study's comprehensive nature, encompassing participants from all regions of Chile, ensures external representativeness of the findings to the broader population. Another limitation of this study is the operationalization of multimorbidity. While the use of a binary threshold (presence of two or more chronic conditions) is a common approach in large-scale epidemiological studies, it represents a simplification. We acknowledge that more sophisticated methods, such as assessing disease clusters or severity scores, offer a more nuanced understanding of the relationship between multimorbidity and functioning outcomes. However, the data available from the 2015 Chilean National Disability Survey (II ENDISC) did not allow for such granular analysis. Another aspect was that variable selection in this study was based on bivariate significance ($p < 0.20$), followed by stepwise procedures. We recognize that this strategy can lead to overfitted and unstable estimates [32]. However, given the exploratory nature of our analysis, this approach was considered acceptable. Future research using more comprehensive clinical datasets and considering theory-based or penalized regression methods is warranted to improve model stability and explore these complex relationships in the population and to inform more targeted clinical and public health interventions.

5. Conclusions

The findings of this study highlight the association between multimorbidity and disability (operationalized by capacity and performance) of individuals, particularly in socioeconomically vulnerable populations. Risk factors associated with worse outcomes include female gender, aging, and poorer self-assessment of health, while higher education and employment are protective factors. These results underscore the importance of addressing multimorbidity and its associated factors in healthcare planning and intervention strategies to improve the well-being and functioning outcomes of affected individuals.

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Informed Consent Statement: Participants of the second National Disability Study (II ENDISC) consented to participate in the national survey conducted by the National Institute of Statistics of Chile, in accordance with the Legal Framework for Statistical Research established by Law No.17.374.

Data Availability Statement: The data is publicly available at https://www.senadis.gob.cl/pag/356/1625/base_de_datos (accessed on 21 June 2025).

Conflicts of Interest: The authors declare no conflicts of interest.

Disability Language/Terminology Positionality Statement: In this article, terminology is informed by the International Classification of Functioning, Disability and Health (ICF), which is the framework adopted by the World Health Organization (WHO) to describe functioning, disability, and health. The health survey that provided the data source also employed the ICF framework in the development of its assessment instrument. Accordingly, we adopted this terminology to ensure consistency with the standards established by the WHO, with the disciplinary context of public health and rehabilitation research, and with the cultural and legal context in which the survey was conducted. Additionally, we adopted person-first language throughout the manuscript (e.g., "individuals with multimorbidity" rather than "multimorbid individuals") to emphasize the person before the condition and align with inclusive and respectful communication practices recommended in health and disability research.

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