

Investigación original / Original research

Income-related inequality in health and health care utilization in Chile, 2000–2009

Felipe Vásquez,¹ Guillermo Paraje,² and Manuel Estay³

Suggested citation

Vásquez F, Paraje G, Estay M. Income-related inequality in health and health care utilization in Chile, 2000–2009. *Rev Panam Salud Publica*. 2013;33(2):98–106.

ABSTRACT

Objective. To measure and explain income-related inequalities in health and health care utilization in the period 2000–2009 in Chile, while assessing variations within the country and determinants of inequalities.

Methods. Data from the National Socioeconomic Characterization Survey for 2000, 2003, and 2009 were used to measure inequality in health and health care utilization. Income-related inequality in health care utilization was assessed with standardized concentration indices for the probability and total number of visits to specialized care, generalized care, emergency care, dental care, mental health care, and hospital care. Self-assessed health status and physical limitations were used as proxies for health care need. Standardization was performed with demographic and need variables. The decomposition method was applied to estimate the contribution of each factor used to calculate the concentration index, including ethnicity, employment status, health insurance, and region of residence.

Results. In Chile, people in lower-income quintiles report worse health status and more physical limitations than people in higher quintiles. In terms of health service utilization, pro-rich inequities were found for specialized and dental visits with a slight pro-rich utilization for general practitioners and all physician visits. All pro-rich inequities have decreased over time. Emergency room visits and hospitalizations are concentrated among lower-income quintiles and have increased over time. Higher education and private health insurance contribute to a pro-rich inequity in dentist, general practitioner, specialized, and all physician visits. Income contributes to a pro-rich inequity in specialized and dentist visits, whereas urban residence and economic activity contribute to a pro-poor inequity in emergency room visits.

Conclusions. The pattern of health care utilization in Chile is consistent with policies implemented in the country and in the intended direction. The significant income inequality in the use of specialized and dental services, which favor the rich, deserves policy makers' attention and further investigation related to the quality of these services.

Key words

Health inequalities; equity in access; equity in health; health economics; Chile.

At the turn of this century, several health indicators showed a clear gap among the worse off and the better off in Chile, leading the government to establish a new health objective for the de-

cade; the declared goal was to improve equity in Chile's health care system (1). In 2005, the government implemented a comprehensive health reform, the so-called Plan AUGE (Acceso Universal con Garantías Explícitas), which provides universal access with explicit guarantees for a number of prioritized conditions (the initial 25 were rapidly raised to the current 66), regardless of ability to pay or insurance coverage. Implementation

of this reform quickly led to an increased number of health care visits, at least for those conditions included in the AUGE list. It also helped to improve the effectiveness of certain treatments covered by AUGE (2).

No systematic assessment has been made with regard to the evolution of inequality or inequity in health care in the past decade. Previous studies analyzing inequalities in health care utilization in

¹ Facultad de Economía y Negocios, Universidad del Desarrollo, Concepción, Chile. Send correspondence to: Felipe Vásquez, fvlavin@gmail.com

² Escuela de Negocios, Universidad Adolfo Ibáñez, Santiago, Chile.

³ Departamento de Economía, Universidad de Concepción, Concepción, Chile.

Chile were mainly descriptive and had limited scope (3); they focused on specific dimensions, such as gender differences (4–6), and they used data from the 1980s and 1990s (7).

Chile has experienced an epidemiologic and social transition that is evident from changes in health, sanitation, education, and socioeconomic indicators; however, some inequalities persist among these indicators (1). Since the second half of the 20th century, major causes of death have shifted from communicable diseases, which affected more children than adults, to noncommunicable diseases, such as cardiovascular diseases, cancer, and external causes, which affect mainly adults. These important changes reduced mortality rates among children under the age of 5 years, shifting the mortality distribution from the youngest group in the 1950s (31.9%) to the oldest group in the past decade (46.2%) and increasing life expectancy at birth from 55 years in the 1950s to 78 years between 2005 and 2010 (8). This trend in mortality has rapidly transformed the population from a juvenile structure in 1990 and prior years to a predominantly middle-aged population by 2010. The current estimated Chilean population is 17 million (9).

Illiteracy, average years of education, and primary and secondary school attendance improved significantly between 1990 and 2003. Illiteracy rates declined from 6.3% in 1990 to 4.2% in 2003, while the average grade completed increased from 9 to 10.2 during the same period. Enrollment increased from 96.9% to 99.1% for primary education and from 80% to 92.8% for secondary education. Despite these gains, disparities in educational achievement have persisted between lower- and higher-income quintiles, since most improvements have benefited those in the upper quintiles (10).

Chile is in the upper-middle-income category in the World Bank classification, with a per capita annual income adjusted for purchasing power parity of US\$ 13 270 in 2008 (11). Between 1990 and 2006, Chile experienced steady economic growth averaging 3.9% (12). Poverty and indigence levels decreased from 39% and 13% in the early 1990s to historically low levels of 13.7% and 3.2%, respectively, in 2006.

Despite this positive economic evolution, the degree of income inequality in

the country showed little improvement. The Gini coefficient in Chile ranged from 0.57 to 0.58 between 1992 and 2003 and reached a low of 0.54 in 2006, placing Chile at a relatively high level of income inequality. Furthermore, the upper quintile held 50% of the total income, with the lower quintile's share at only 6% (11).

The Chilean population relies on public or private health insurance for the provision of health services. The population's distribution by type of insurance shows a clear socioeconomic pattern, with high-income low-risk people covered predominantly by private insurance, while low-income high-risk people rely on public sector coverage.

Public health insurance is provided through the National Health Fund (Fondo Nacional de Salud, FONASA), which is financed by compulsory contributions (7% of an individual's gross income), the national government's health budget, copayments, and other sources. Direct public contributions were consistently more than 50% of total revenues in the past decade. In 2010, more than 72% of the population was covered by public insurance, compared with 57% in 1997.

FONASA insures individuals who chose to remain in the public system and those who cannot pay for coverage. Individuals' contributions and benefits depend on their income only and not on their health risk, age, sex, or preexisting causes.

On the other hand, the private health insurance system, whose market share was around 17% in 2010, is managed by Instituciones de Salud Previsional (ISAPRES). Like the public insurance system, the compulsory contribution to ISAPRES is also 7% of an individual's gross income, but it can be higher depending on the benefits provided. Private insurers establish costs and benefits for services to beneficiaries based on health risks and subject to government policy regulations. ISAPRES members can also access public health services for emergency service, intensive care treatment, or hospitalization.

Between 2000 and 2009, ISAPRES concentrated individuals from the top two income quintiles, with a higher proportion of men and youth than the population average (lower relative risk population). For example, according to the 2009 Encuesta de Caracterización Socioeconómica Nacional (CASEN), a

national socioeconomic characterization survey, while 79% of the total population was in FONASA, public insurance covered a greater share (87.5%) of the population age 65 or older. On the other hand, ISAPRES beneficiaries, who accounted for 13% of the total population, were disproportionately rich, with 45% belonging to the top income quintile.

The objective of this study is to estimate and decompose the indices of inequality and inequity for health care in Chile from 2000 to 2009.

MATERIALS AND METHODS

Study design

This cross-sectional study compares income-related inequalities in health and health care utilization in Chile using data from CASEN for 2000, 2003, and 2009. CASEN is a household survey conducted by the Chilean Ministerio de Desarrollo Social, with national, regional, municipal, urban, and rural representation. The 2009 CASEN survey included 334 municipalities, 71 460 households, and 246 924 individuals. The 2003 CASEN survey included 302 municipalities, 68 153 households, and 257 077 individuals and the 2000 CASEN survey had 286, 65 036, and 252 748, respectively. Only individuals 18 years or older were considered in this study.

Variables

CASEN has several variables that can be used to define income, including wages, subsidies and transfers, and pensions. Disposable family income was calculated by adding all these entries when available data made it possible to do so. Individual income was calculated by dividing disposable family income by the number of equivalent adults in the household, according to Deaton's approach in which adults have a weight of 1 and individuals younger than 14 years have a weight of 0.75 (13). For all estimations, the standard-of-living variable was the disposable income per equivalent adult.

Dependent variables for calculating the concentration index and horizontal inequality index included health status variables (self-assessed health and physical limitations) and health care utilization variables, such as visits to a general practitioner (GP); visits to a specialist;

total number of physician visits, which is the sum of GP and specialist visits; and emergency room (ER) visits, dentist visits, mental health care visits, and hospital visits. These variables are defined and described in Tables 1 and 2. Table 3 shows the quintile distributions of health and health care variables for each level of the variables. Age, sex, self-assessed health, and physical limitations were used as standardized variables; country region, education, employment activity,

ethnicity, rural or urban residence, and health insurance coverage were used as explanatory variables. All analyses included the same standardization variables except for dentist visits and health status variables, which did not consider self-assessed health and gender.

RESULTS

Linear (ordinary least squares) and nonlinear (Probit model for probabil-

ity and Poisson and negative binomial models for intensity of use) models were run for each dependent variable. Linear models are not appropriate for count or binary data; therefore, the best-fit nonlinear model was selected for the data by analyzing the log likelihood, the Akaike information criterion, and the Bayesian information criterion. Then, the best model was used to calculate the horizontal inequality index and to compare it with those obtained

TABLE 1. Description of the Encuesta de Caracterización Socioeconómica Nacional (CASEN) survey variables, Chile, 2000–2009

Variable	Description	Question
Health status		
Self-assessed health	A set of dummy variables taking a value of 1 for very good, good, fair, poor, and very poor health status, and 0 otherwise. Baseline is very good.	How do you consider your own health status? 1: very good, 2: good, 3: fair, 4: poor, 5: very poor.
Physical limitation	Dummy variable with value of 1 for moderate or severe disability.	Do you present any of the following deficiencies: hear, talk, see, mental, physical or psychiatric. If people were unable to work because of their disability the variable was defined as severe.
Chronic illness	Not available	
Health care utilization		
Total physician visits	Numeric count: sum of total visits to general practitioners and specialists in past 3 months.	
General practitioner visit	Numeric count: total visits to general practitioner in past 3 months.	Considering the following health care services, how many consultations did you have during past 3 months? General practitioner.
Specialist visit	Numeric count: total visits to a specialist in past 3 months.	Considering the following health care services, how many consultations did you have during past 3 months? There was a list of different specialists.
Emergency room visit	Numeric count: total visits to an emergency room in past 3 months.	Considering the following health care services, how many consultations did you have during past 3 months? Emergency room visit.
Dentist visit	Numeric count: total visits to a dentist in past 3 months.	Considering the following health care services, how many consultations did you have during past 3 months? Dentist.
Hospitalization	Numeric count: days spent in a hospital in past 12 months.	In past 12 months, have you been hospitalized? For how long?
Mental health consultation	Numeric count: number of mental health consultations in past 3 months.	Considering the following health care services, how many consultations did you have during past 3 months? Psychologist, psychiatrist.
Standard of living		
Income	Continuous: household income per equivalent adult	
Other		
Ethnicity	Dummy variable takes a value of 1 if person belongs to an indigenous group.	Chilean law recognized 8 indigenous groups of people; do you belong to any of them?
Education	Dummy variable takes a value of 1 for no education or low education, middle school education, or higher education. Higher education is baseline in regression.	Last grade approved.
Age and sex	Dummy variable takes a value of 1 for female with range of age in the name of the variable or dummy variable takes a value 1 for male with range of age in the name of the variable. Baseline is male between 18 and 34 years old.	Age in years and gender.
Geographic region	Dummy variable takes a value of 1 if individual lives in regions I to XII or the capital. Capital is baseline.	
Area of residence	Dummy variable takes a value of 1 for rural areas, 0 otherwise.	
Economic activity	Dummy variable takes a value of 1 for self-employment, employed, unemployed, pensioner, student or house worker, or other employment status. Baseline is employed.	
Marital status	Dummy variable takes a value of 1 for married or couple living together, 0 otherwise.	
Health system	Dummy variable takes a value of 1 if individual belongs to public health system, has private insurance, has no insurance or other system.	

TABLE 2. Descriptive statistics, Chile, 2000–2009

Variable	2000				2003				2009			
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
Age (years)												
18–34	0.397	0.489	0	1	0.392	0.488	0	1	0.355	0.478	0	1
35–44	0.227	0.419	0	1	0.221	0.415	0	1	0.187	0.390	0	1
45–54	0.157	0.364	0	1	0.165	0.371	0	1	0.185	0.388	0	1
55–64	0.103	0.304	0	1	0.108	0.310	0	1	0.126	0.331	0	1
65–74	0.073	0.260	0	1	0.070	0.255	0	1	0.085	0.278	0	1
≥ 75	0.043	0.202	0	1	0.045	0.207	0	1	0.063	0.244	0	1
Sex												
Male	0.522	0.499	0	1	0.522	0.500	0	1	0.531	0.499	0	1
Female	0.478	0.499	0	1	0.478	0.500	0	1	0.469	0.499	0	1
Health status												
Very poor	0.008	0.087	0	1	0.011	0.106	0	1	0.011	0.105	0	1
Poor	0.065	0.246	0	1	0.066	0.248	0	1	0.040	0.196	0	1
Fair	0.277	0.448	0	1	0.289	0.453	0	1	0.203	0.403	0	1
Good	0.543	0.498	0	1	0.511	0.500	0	1	0.532	0.499	0	1
Very good	0.098	0.297	0	1	0.122	0.328	0	1	0.112	0.315	0	1
Physical limitations												
None	0.918	0.274	0	1	0.945	0.229	0	1	0.902	0.298	0	1
Moderate	0.054	0.226	0	1	0.031	0.174	0	1	0.095	0.294	0	1
Severe	0.027	0.163	0	1	0.024	0.153	0	1	0.003	0.055	0	1
Chronic disease												
None												
Any												
Ethnicity	n.a.	n.a.	n.a.	n.a.	0.051	0.219	0	1	0.063	0.243	0	1
Education												
Primary or no education	0.291	0.454	0	1	0.317	0.465	0	1	0.301	0.459	0	1
Secondary	0.496	0.500	0	1	0.461	0.498	0	1	0.461	0.498	0	1
High school or more	0.213	0.409	0	1	0.221	0.415	0	1	0.238	0.426	0	1
Activity status												
Employed	0.428	0.495	0	1	0.431	0.495	0	1	0.426	0.494	0	1
Unemployed	0.060	0.237	0	1	0.059	0.235	0	1	0.059	0.236	0	1
Housework	0.196	0.397	0	1	0.181	0.385	0	1	0.041	0.197	0	1
Self-employed	0.107	0.309	0	1	0.111	0.315	0	1	0.108	0.310	0	1
Pensioner	0.078	0.268	0	1	0.081	0.273	0	1	0.058	0.233	0	1
Student	0.059	0.235	0	1	0.063	0.242	0	1	0.034	0.182	0	1
Other	0.074	0.261	0	1	0.074	0.262	0	1	0.275	0.447	0	1
Private health insurance												
Public	0.655	0.475	0	1	0.710	0.454	0	1	0.730	0.444	0	1
Private	0.195	0.396	0	1	0.168	0.374	0	1	0.025	0.157	0	1
No insurance	0.113	0.316	0	1	0.087	0.282	0	1	0.134	0.341	0	1
Other	0.038	0.191	0	1	0.035	0.185	0	1	0.091	0.288	0	1
Location												
Urban	0.859	0.348	0	1	0.870	0.336	0	1	0.871	0.335	0	1
Rural	0.141	0.348	0	1	0.130	0.336	0	1	0.129	0.335	0	1
Geographic region												
I	0.026	0.160	0	1	0.027	0.162	0	1	0.027	0.163	0	1
II	0.030	0.170	0	1	0.032	0.175	0	1	0.032	0.175	0	1
III	0.016	0.127	0	1	0.016	0.126	0	1	0.015	0.121	0	1
IV	0.037	0.190	0	1	0.040	0.196	0	1	0.042	0.201	0	1
V	0.105	0.307	0	1	0.103	0.304	0	1	0.103	0.304	0	1
VI	0.053	0.223	0	1	0.053	0.223	0	1	0.052	0.223	0	1
VII	0.060	0.237	0	1	0.060	0.237	0	1	0.059	0.236	0	1
VIII	0.128	0.334	0	1	0.122	0.327	0	1	0.119	0.324	0	1
IX	0.055	0.229	0	1	0.056	0.229	0	1	0.055	0.228	0	1
X	0.068	0.252	0	1	0.068	0.252	0	1	0.069	0.254	0	1
XI	0.006	0.075	0	1	0.006	0.075	0	1	0.006	0.077	0	1
XII	0.010	0.100	0	1	0.009	0.097	0	1	0.009	0.096	0	1
Metropolitan	0.405	0.491	0	1	0.409	0.492	0	1	0.411	0.492	0	1
Marital status												
Married	0.508	0.500	0	1	0.474	0.499	0	1	0.420	0.494	0	1
Living together	0.102	0.302	0	1	0.121	0.326	0	1	0.140	0.347	0	1
Other	0.389	0.487	0	1	0.405	0.491	0	1	0.439	0.496	0	1

S.D.: standard deviation, Min: minimum, Max: maximum, n.a.: not applicable.

using the linear model. The concentration index is not changed by selection of the model (14).

The inequality of the concentration index and the horizontal inequality index was decomposed for each depen-

dent variable. This decomposition indicated how different variables or groups of variables contributed to inequality

TABLE 3. Standardized quintile distributions of health and health care variables, Chile, 2000–2009

Variable	Year	Mean	Poorest 20%	2nd poorest 20%	Middle	2nd richest 20%	Richest 20%
Health status							
Less than good self-assessed health	2000	0.378	0.480	0.434	0.406	0.341	0.217
	2003	0.380	0.502	0.439	0.392	0.326	0.222
	2009	0.356	0.450	0.400	0.364	0.329	0.240
Good or very good self-assessed health	2000	0.622	0.520	0.566	0.594	0.659	0.783
	2003	0.620	0.498	0.561	0.608	0.674	0.778
	2009	0.644	0.550	0.600	0.636	0.671	0.760
Severe physical limitations	2000	0.029	0.055	0.038	0.025	0.018	0.010
	2003	0.024	0.046	0.032	0.020	0.014	0.006
	2009	0.003	0.007	0.004	0.002	0.001	0.001
Some physical limitations	2000	0.085	0.126	0.101	0.086	0.069	0.045
	2003	0.055	0.087	0.070	0.052	0.040	0.026
	2009	0.098	0.160	0.112	0.091	0.073	0.055
No physical limitations	2000	0.915	0.874	0.900	0.914	0.931	0.955
	2003	0.945	0.913	0.930	0.948	0.960	0.974
	2009	0.902	0.840	0.888	0.909	0.927	0.945
Health care utilization							
Any doctor visit	2000	0.166	0.126	0.131	0.156	0.173	0.249
	2003	0.177	0.116	0.134	0.169	0.204	0.274
	2009	0.207	0.179	0.189	0.194	0.205	0.268
Total doctor visits	2000	0.327	0.225	0.244	0.313	0.341	0.523
	2003	0.353	0.217	0.242	0.320	0.437	0.571
	2009	0.463	0.386	0.423	0.410	0.468	0.628
Any general practitioner visit	2000	0.093	0.086	0.086	0.097	0.086	0.112
	2003	0.088	0.078	0.082	0.087	0.096	0.100
	2009	0.146	0.137	0.143	0.142	0.142	0.168
Total general practitioner visits	2000	0.146	0.128	0.142	0.155	0.132	0.173
	2003	0.140	0.130	0.124	0.136	0.156	0.157
	2009	0.283	0.270	0.279	0.261	0.273	0.332
Any specialist visit	2000	0.088	0.052	0.054	0.072	0.104	0.161
	2003	0.106	0.045	0.062	0.097	0.133	0.201
	2009	0.089	0.059	0.071	0.075	0.093	0.148
Total specialist visits	2000	0.182	0.097	0.102	0.158	0.210	0.350
	2003	0.213	0.087	0.119	0.184	0.281	0.415
	2009	0.180	0.117	0.144	0.149	0.196	0.296
Any hospitalization	2000	0.069	0.071	0.061	0.069	0.067	0.078
	2003	0.077	0.069	0.070	0.074	0.079	0.096
	2009	0.065	0.065	0.062	0.062	0.065	0.070
Total inpatient days	2000	0.674	0.688	0.621	0.754	0.678	0.630
	2003	0.634	0.618	0.607	0.655	0.596	0.695
	2009	0.559	0.612	0.601	0.535	0.545	0.504
Any dentist visit	2000	0.108	0.070	0.069	0.098	0.111	0.192
	2003	0.109	0.071	0.078	0.091	0.126	0.177
	2009	0.049	0.037	0.038	0.043	0.051	0.076
Total dentist visits	2000	0.262	0.147	0.156	0.231	0.294	0.485
	2003	0.241	0.146	0.159	0.204	0.272	0.422
	2009	0.110	0.074	0.082	0.088	0.118	0.189
Any emergency room visit	2000	0.045	0.043	0.049	0.042	0.046	0.045
	2003	0.055	0.050	0.058	0.059	0.064	0.046
	2009	0.059	0.068	0.060	0.059	0.053	0.057
Total emergency room visits	2000	0.068	0.066	0.075	0.067	0.065	0.067
	2003	0.084	0.078	0.089	0.091	0.093	0.069
	2009	0.100	0.124	0.098	0.102	0.090	0.089
Any mental health attendance	2009	0.022	0.024	0.018	0.020	0.022	0.029
Total mental health attendance	2009	0.062	0.057	0.045	0.054	0.055	0.098

(see Figure 1). Given that the linear and nonlinear horizontal inequality indices were similar, the linear models were used for the decomposition. The decomposition method relies on the linearity of the regression model and can be applied to nonlinear models only if partial effects are used, but they are an approximation and usually introduce errors. A sensitivity analysis was done with the linear and

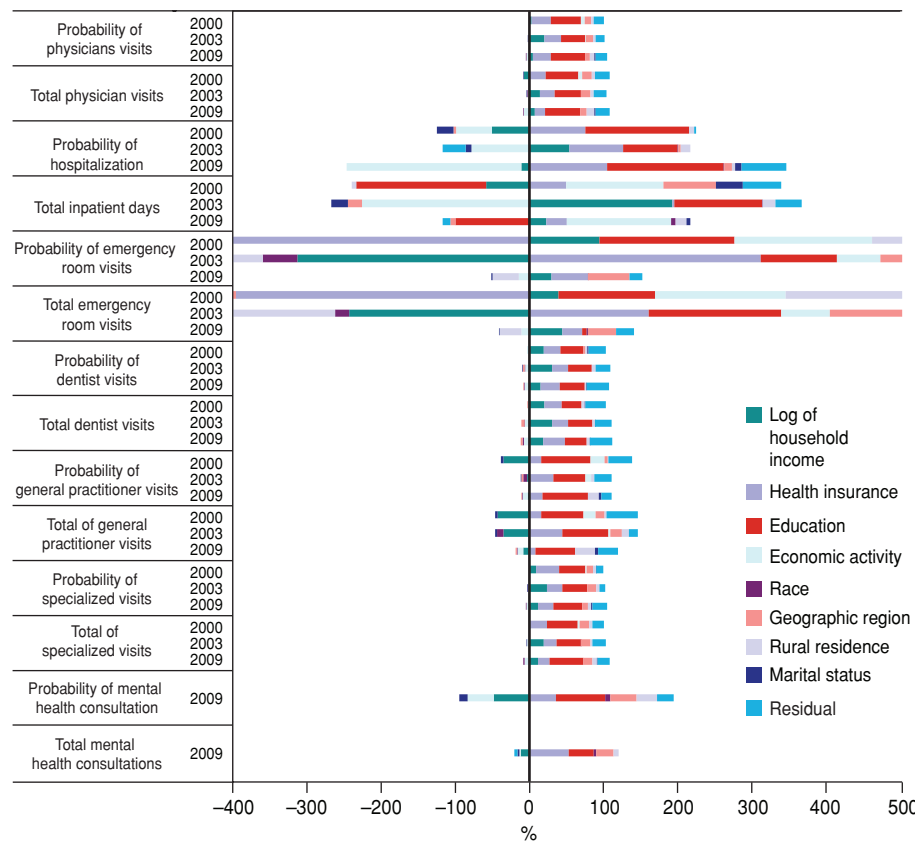
count models (or binary model), and it was found that in the decompositions for the linear model, most of the variation in the index was explained by observed variables; in the nonlinear models, a significant part of the decomposition was explained by the unobserved component (more than 100%).

Table 4 shows the concentration index, horizontal inequality index, and differ-

ences among indices in different years. Concentration curves, which provide a visual illustration of the inequalities, are provided in [supplementary material](#).

Self-assessed health had negative concentration and health inequality indices, meaning a pro-poor distribution; in other words, people in lower quintiles reported worse health status than rich people. With regard to magnitude, in-

FIGURE 1. Contribution of need variables to inequity (horizontal inequality index) in health care utilization, Chile, 2000–2009



equality increased between 2000 and 2003, but it significantly decreased in 2009. Inequality related to physical limitations increased significantly in the period 2000–2009. This result is unexpected as it is reasonable that the proportion of people with physical limitations does not change rapidly since public health policy cannot systematically affect this variable in such a short time. This result can be explained by a change in the question about physical limitations in the 2009 survey.

Generally, pro-rich inequality was observed for dentist and specialized medical visits, and pro-poor inequality was observed for GP visits, ER visits, and inpatient days for all years studied. Major contributors to pro-rich inequality were private health insurance and education, while major contributors to pro-poor inequality were income and education. This result simply shows that access to specialized care (including dentists) was largely determined by private insurance coverage (which is correlated to income, though a sizeable number of relatively well-off people are covered by public insurance). This fact does not necessarily indicate that beneficiaries of public insurance lack access to specialists; it points out a difference in how the two systems are organized. To see a specialist

TABLE 4. Concentration indices for health status and health care utilization variables, Chile, 2000–2009

Variable	2000		2003		2009		2000–2003		2003–2009		2000–2009	
	CI	HI	CI	HI	CI	HI	CI	HI	CI	HI	CI	HI
Self-assessed health (less than good)	-0.148 ^a	-0.135 ^a	-0.161 ^a	-0.149 ^a	-0.129 ^a	-0.116 ^a	0.013 ^a	0.013 ^a	-0.032 ^a	-0.032 ^a	-0.019 ^a	-0.103 ^a
Physical limitation (any)	-0.196 ^a	-0.193 ^a	-0.228 ^a	-0.231 ^a	-0.224 ^a	-0.211 ^a	0.032 ^a	0.037 ^a	-0.004 ^a	-0.020 ^a	0.028 ^a	-0.173 ^a
Physician visit (prob)	0.064 ^a	0.144 ^a	0.082 ^a	0.178 ^a	0.021 ^a	0.079 ^a	-0.017 ^a	-0.034 ^a	0.061 ^a	0.099 ^a	0.044 ^a	0.045 ^a
Physician visits (total)	0.054 ^a	0.171 ^a	0.084 ^a	0.210 ^a	0.017 ^a	0.097 ^a	-0.029 ^a	-0.038 ^a	0.067 ^a	0.113 ^a	0.037 ^a	0.058 ^a
Hospitalization (prob)	-0.031 ^a	0.022 ^a	-0.003 ^a	0.069 ^a	-0.041 ^a	0.015 ^a	-0.028 ^a	-0.047 ^a	0.038 ^a	0.054 ^a	0.010 ^a	-0.032 ^a
Hospitalization (days)	-0.112 ^a	-0.010 ^a	-0.091 ^a	0.012 ^a	-0.130 ^a	-0.045 ^a	-0.022 ^a	-0.022 ^a	0.040 ^a	0.057 ^a	0.018 ^a	-0.067 ^a
Emergency room visit (prob)	-0.074 ^a	-0.002	-0.088 ^a	-0.004 ^a	-0.107 ^a	-0.040 ^a	0.014 ^a	0.002	0.019 ^a	0.035 ^a	0.033 ^a	-0.037 ^a
Emergency room visits (total)	-0.100 ^a	-0.014 ^a	-0.121 ^a	-0.012 ^a	-0.151 ^a	-0.063 ^a	0.021 ^a	-0.001	0.030 ^a	0.051 ^a	0.051 ^a	-0.064 ^a
Dentist visit (prob)	0.221 ^a	0.227 ^a	0.197 ^a	0.199 ^a	0.165 ^a	0.163 ^a	0.023 ^a	0.028 ^a	0.032 ^a	0.036 ^a	0.056 ^a	0.191 ^a
Dentist visits (total)	0.255 ^a	0.264 ^a	0.226 ^a	0.227 ^a	0.212 ^a	0.208 ^a	0.029 ^a	0.036 ^a	0.014 ^a	0.019 ^a	0.042 ^a	0.245 ^a
General practitioner visit (prob)	-0.004 ^a	0.043 ^a	-0.017 ^a	0.051 ^a	-0.027 ^a	0.035 ^a	0.013 ^a	-0.008 ^a	0.011 ^a	0.015 ^a	0.023 ^a	0.028 ^a
General practitioner visits (total)	-0.024 ^a	0.046 ^a	-0.041 ^a	0.048 ^a	-0.044 ^a	0.036 ^a	0.017 ^a	-0.002	0.003 ^a	0.012 ^a	0.020 ^a	0.034 ^a
Specialist visit (prob)	0.131 ^a	0.252 ^a	0.161 ^a	0.298 ^a	0.124 ^a	0.187 ^a	-0.030 ^a	-0.046 ^a	0.036 ^a	0.111 ^a	0.007 ^a	0.142 ^a
Specialized visits (total)	0.113 ^a	0.272 ^a	0.162 ^a	0.316 ^a	0.111 ^a	0.191 ^a	-0.050 ^a	-0.044 ^a	0.051 ^a	0.125 ^a	0.001	0.147 ^a
Mental health attendance visit (prob)					-0.031 ^a	0.049 ^a						
Mental health attendance visits (total)					0.032 ^a	0.122 ^a						

CI: concentration index, HI: horizontal inequality index, prob: probability.
^a CI and HI are significant at $P < 0.05$.

in the public system, beneficiaries must first see a GP, who then directs them to a specific specialist. In the private system, beneficiaries can immediately see a specialist (there are no gatekeepers).

The decomposition of, for instance, ER visits showed a different pattern. In this case, the main variables explaining inequality for all years were variables related to need, which demonstrated that services were available to everyone, that poor people used them more frequently, and that poor people were more likely to use the system when their health conditions had deteriorated enough to visit an ER instead of seeing a GP or a specialist earlier.

In the first period under analysis (from 2000 to 2003), inequality increased for self-assessed health, physical limitations, ER, GP, and specialist visits and decreased for hospital and dentist visits. In all cases, the changes were relatively small, showing a rather stable situation in the health care system. In the second period (from 2003 to 2009), inequality increased for hospital, ER, and GP visits (they became more pro-poor); for self-assessed health, physical limitations, dentist visits, and specialist visits inequality decreased (they became less pro-rich). The reform implied an increase in the mean use of certain services (GP, ER) and a reallocation of resources within the public system, changing the relative availability of certain services (and the intensity of use of others, especially those included in AUGE). This result may explain the changes in concentration index values, although a more thorough study of the changes should be conducted.

When the concentration index was standardized according to individuals' need and the horizontal inequality index was calculated, some indices reversed their sign for some years. Generally, standardized indices with a more pro-rich pattern were observed compared with nonstandardized indices. The indices calculated using a probabilistic (0/1) and continuous dependent variable gave similar qualitative results. For example, dental treatment coverage for the poorest was lower than coverage for the richest, and the frequency of dental treatment depends on having disposable income to pay for it; therefore, a higher level of inequity was expected in intensity than in probability of health care utilization. Poor people had less utiliza-

tion (less availability of dentists in the public system and longer waiting times), but they also visited dentists for shorter treatments than the rich. In contrast, for hospitalizations, poor people used hospitals more intensively than rich people (controlled by need variables). The intensity of hospital use had a stronger level of inequity than that of probability of health care utilization. This finding means that rich people tended to use the system more frequently (for hospitalization), but poor people stayed longer once they used it. The fact that some of these health care services—for example, ER, self-assessed health, and hospital visits—have a pro-poor distribution does not necessarily show a desirable situation. The greater relative use of ER and hospital visits by the poor may come from the fact that when they do access the system it is in more critical situations than average. This finding could indicate that relatively poor individuals chose to postpone or avoid visiting a doctor since in a high percentage of cases they had associated costs. For instance, during 2009, the percentages of individuals who received free care from GPs and specialists were 60% and 42%, respectively; in the case of ER visits, the percentage was 70%. This percentage shows that a significantly higher percentage of those who used ER visits did not pay for their visits compared with other medical visits.

DISCUSSION

To the best of the authors' knowledge, this study is the first that uses the methodology described by Almeida and Mori to estimate inequalities in health care utilization in Chile for a large number of health indicators (15). The study forms part of a major effort by the Pan American Health Organization (PAHO) to use a standardized methodology to compare income-related inequalities in health and health care across countries. While, there are several comparisons of health care utilization inequalities among European countries (16–20), for Latin American countries, this type of study is more limited. A previous investigation by PAHO used data from the 1990s to compare four countries, but Chile was not among them (21). Recently, Balsa and Rossi calculated inequalities for four major cities in South America using data from a survey administered only to elderly adults in 2000 (finding inequalities in only two

of the cities) (22). This paper helps to update previous analyses for the Chilean case, using new sources of data, a more recent period of time (past decade), and a large number of health care services.

The results of this paper should be considered as preliminary, as it has several limitations (some of them are due to available data). First, a number of alternative nonlinear estimations that take into account both probability of health care utilization decisions and intensity of use decisions (23–26) could be considered and compared with the results presented here. However, the linear model was used here in order to minimize errors in the (linear) decomposition and to gain comparability across studies. The decomposition is, in essence, a simple statistical exercise. It is not derived from a structural-form relationship (the regression relating health care utilization and independent variables was not based on individual causal models). This fact means that the channels by which an independent variable affects inequality are often hidden in the aggregated relationship. When indices of inequality (or inequity) are relatively small, the decomposition of those indices may show some variables exerting an undue influence.

Second, regional differences were not considered in health care utilization. In the case of a rather centralized country, such as Chile, looking through a regional lens can provide insights about how the health care system is working and reaching populations with different characteristics and needs.

Finally, changing the population under analysis—for example, including young people—could significantly change the results. These aspects are well worth investigating in future research.

Chile's improvements in health have been impressive over the past three decades. However, health inequality has been a major concern and the main motivation behind recent health reforms. This study shows that those concerns are justified. While utilization of GPs, ERs, and hospitalization has a pro-poor distribution, utilization of medical specialists and dentists shows a strong pro-rich distribution. In general, these patterns are stable and a clear trend was observed in all utilization variables toward a decline in inequality in Chile over time.

The patterns observed are in part related to the structural problems of the Chilean health care system—specifically,

those present before the recent health care reform, in which the rich had private insurance coverage and easy access to the health care system, utilizing specialized care as needed and without a gatekeeper. In contrast, the poor relied on public insurance and received their health services through public providers, with GPs as gatekeepers to gain access to specialists (increasing the use of GPs and decreasing the use of specialists). More frequent ER visits by the poor may indicate delayed use of necessary care (waiting until episodes of illness are acute before seeking care) or the need to utilize the system outside regular business hours (because they cannot leave work to see doctors).

Decomposition analysis shows that socioeconomic factors are major contributors to the inequality still present in Chile and that the recent health care reform did not significantly change this

situation. In the case of ER visits, the trend is clear: those with private insurance use ERs far less than those without access to private insurance (usually the poor). With regard to access and utilization of specialists and dentists, private health insurance, income, and education also explain inequalities: the poor, with no private insurance and lower educational attainment, use these services much less than the rich. The reform reallocated resources in the health care system, such as time, human resources, and equipment, toward AUGE conditions and away from non-AUGE as demonstrated by the appearance of long waiting lists for certain non-AUGE conditions in the public system. But the reform did not alter the duality of the health care system. Since the reform, relatively rich people with private insurance still have better access to relatively better services (although quality of ser-

vice was not discussed here). This study shows that the socioeconomic gradient did not disappear with the reform.

In summary, this study shows that equity is the Achilles heel of the Chilean health care system. Even with reform aimed at tackling this problem, inequalities and inequities in the use of health care services remain. Their existence is most likely explained by the segmentation of the health care system and lack of solidarity across its different segments—issues that the reform did not address.

Funding. This study was funded by the Equity in Health Systems in Latin America and the Caribbean (EquiLAC) Project of the Pan American Health Organization and the Chilean Fondo Nacional de Ciencia y Tecnología (Project 1110334).

Conflict of interest. None.

REFERENCES

- Ministerio de Salud, Gobierno de Chile. Estado de avance en los objetivos de impacto. Objetivos sanitarios para la década 2000–2010. Santiago de Chile: Ministerio de Salud, Gobierno de Chile; 2006.
- Bitran R, Escobar L, Gassibe P. After Chile's health reform: increase in coverage and access, decline in hospitalization and death rates. *Health Aff (Millwood)*. 2010;29(12):2161–70.
- Hernández S, Sandoval H, Delgado I. Las diferencias entre lo público y lo privado. In: *Iniciativa Chilena de Equidad en Salud*, ed. La perspectiva de la equidad. Santiago de Chile: Iniciativa Chilena de Equidad en Salud; 2005. Pp. 19–28.
- Vega J, Bedregal P, Jadue L, Delgado I. Equidad de género en el acceso a la atención de salud en Chile. *Rev Med Chile*. 2003;131(6):669–78.
- Vega J, Hollstein RD, Delgado I, Pérez J, Carrasco S, Marshall G, et al. Chile: socioeconomic differentials and mortality in a middle-income nation. In: Evans T, Whitehead M, Diderichsen F, Bhuiya A, Wirth M, eds. *Challenging health inequities: from ethics to action*. Oxford: Oxford University Press; 2001. Pp. 123–37.
- Vega J. Enfermo de pobre. *Rev Univ*. 2001;73:43–56.
- Sapelli C, Vial B. Utilización de prestaciones de salud en Chile: ¿es diferente entre grupos de ingreso? *Cuad Econ*. 1998;106(35):343–82.
- Ministerio de Salud, Gobierno de Chile. Available from: <http://www.minsal.cl> Accessed 30 April 2012.
- Instituto Nacional de Estadísticas, Chile. Available from: <http://www.ine.cl> Accessed 30 April 2012.
- Comisión Nacional del XVII Censo de Población y VI de Vivienda. Censo 2002, síntesis de resultados. Santiago de Chile: Comisión Nacional del XVII Censo de Población y VI de Vivienda; 2005.
- World Bank. The World Bank database. Washington, D.C.: World Bank; 2012. Available from: <http://data.worldbank.org> Accessed 15 April 2012.
- Banco Central de Chile. Banco Central de Chile 2012. Available from: <http://www.bcentral.cl> Accessed 30 April 2012.
- Deaton A. The analysis of household surveys: a microeconomic approach to development policy. Baltimore: Johns Hopkins University Press; 1997.
- O'Donnell O, World Bank. Analyzing health equity using household survey data: a guide to techniques and their implementation. Washington, D.C.: World Bank; 2008.
- Almeida G, Mori F. Measuring evolution of income-related inequalities in health and health care utilization in selected Latin American and Caribbean countries. *Rev Panam Salud Publica*. 2013;33(2):83–9.
- van Doorslaer E, Koolman X. Explaining the differences in income-related health inequalities across European countries. *Health Econ*. 2004;13(7):609–28.
- van Doorslaer E, Koolman X, Jones AM. Explaining income-related inequalities in doctor utilisation in Europe. *Health Econ*. 2004;13(7):629–47.
- González Alvarez ML, Barranquero AC. Inequalities in health care utilization in Spain due to double insurance coverage: an Oaxaca-Ransom decomposition. *Soc Sci Med*. 2009;69(5):793–801.
- van Doorslaer E, Masseria C. Income-related inequality in the use of medical care in 21 OECD countries. Paris: Organisation for Economic Co-operation and Development; 2004.
- ECuity Project. ECuity Project, 2012. Available from: www2.eur.nl/ecuity Accessed 15 April 2012.
- Suárez-Berenguela R. Health system inequalities in Latin America and the Caribbean: findings and policy implications. In: Pan American Health Organization, ed. *Investment in health: social and economic returns*. Washington, D.C.: PAHO; 2001. Pp. 119–42.
- Balsa A, Rossi M. Horizontal inequity in access to health care in four South American cities. *Rev Econ Rosario*. 2011;14(1):31–56.
- Grootendorst PV. A comparison of alternative models of prescription drug utilization. *Health Econ*. 1995;4(3):183–98.
- Deb P, Holmes AM. Estimates of use and costs of behavioural health care: a comparison of standard and finite mixture models. *Health Econ*. 2000;9(6):475–89.
- Jiménez-Martín S, Labeaga J, Martínez-Granado M. Latent class versus two-part models in the demand for physician services across the European Union. In: Jones AM, O'Donnell O, eds. *Econometric analysis of health data*. Chichester, United Kingdom: John Wiley and Sons; 2002. Pp. 101–16.
- Jones AM, Rice N, D'Uva TB, Balia S. *Applied health economics*. Abingdon, United Kingdom: Taylor & Francis; 2007.

Manuscript received on 7 March 2012. Revised version accepted for publication on 19 December 2012.

RESUMEN

**Desigualdades en salud
y en la atención sanitaria
relacionadas con los ingresos
en Chile, 2000–2009**

Objetivo. Medir y explicar las desigualdades en salud y en la utilización de la atención sanitaria relacionadas con los ingresos en Chile durante el período 2000–2009, evaluar sus factores determinantes y las variaciones dentro del país.

Métodos. Se usaron datos de las Encuestas de Caracterización Nacional Socio-económica de 2000, 2003 y 2009. La desigualdad en la utilización de la atención sanitaria relacionada con los ingresos se evaluó con los índices estandarizados de concentración para la probabilidad y el total de consultas de atención especializada, general, de urgencia, odontológica, de salud mental y hospitalaria. El estado de salud autoevaluado y las limitaciones físicas se usaron como mediciones indirectas de la necesidad de atención sanitaria. Se estandarizó por variables demográficas y de necesidad; se utilizó el método de descomposición para calcular la contribución de cada uno de los factores usados para calcular el índice de concentración, entre ellos la etnia, el estado de empleo, el seguro de salud y la región de residencia.

Resultados. Las personas en los quintiles de menores ingresos refirieron peor estado de salud y más limitaciones físicas que las de los quintiles superiores. Se encontraron desigualdades a favor de las personas de mayores ingresos para las consultas especializadas y odontológicas, y una leve utilización mayor en este grupo de consultas generales y totales, aunque todas han disminuido en el tiempo. La atención en salas de emergencias y las hospitalizaciones se concentraron en los quintiles de menores ingresos y han aumentado en el tiempo. Los ingresos y tener mayor educación y seguro de salud privado contribuyen a la inequidad a favor de las personas de mayores ingresos respecto de las consultas odontológicas, generales, especializadas y totales, mientras la residencia urbana y la actividad económica contribuyen a la inequidad a favor de las personas de menores ingresos respecto de las consultas en salas de emergencias.

Conclusiones. Los patrones de utilización de la atención sanitaria en Chile concuerdan con las políticas del país y van en la dirección esperada. La significativa desigualdad en el ingreso y en el uso de servicios odontológicos y especializados, que favorece a las personas de mayores ingresos, requiere la atención de las instancias normativas y merece investigaciones adicionales relacionadas con la calidad de estos servicios.

Palabras clave

Desigualdades en la salud; equidad en el acceso; equidad en salud; economía de la salud; Chile.

Material suplementario / Supplementary material / Material supplementar

Supplementary material to:

Ruiz Gómez F, Zapata Jaramillo T, Garavito Beltrán L. Colombian health care system: results on equity for five health dimensions, 2003–2008. *Rev Panam Salud Publica*. 2013;33(2):107–15.

This material formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

