

Educational Inequalities in Cardiovascular Risk Factor and Blood Pressure Control in Elderly Adults

Comparison of MESA Cohort and Chilean NHS Survey Outcome Measures

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ABSTRACT

Background: Social determinants differ between countries, which is not always considered when adapting health policies and interventions to face inequalities in noncommunicable diseases and their risk factors.

Objectives: The study sought to analyze educational inequalities in controlled blood pressure (CBP), obesity, and smoking in study populations from Chile and the United States in 2 periods, both countries with large social inequalities.

Methods: The study used data from the first and fifth waves of the MESA (Multiethnic Study of Atherosclerosis) cohort, and the 2003 and 2009 to 2010 Chilean National Health Survey (CNHS) survey outcome measures. The study compared cardiovascular risk factors prevalence as well as relative index of inequality (RII) and slope index of inequality (SII) between the 2 samples.

Results: In the CNHS 67.9% and 52.6% of participants had below primary education in 2003 and 2009 to 2010, respectively, compared with 12.3% and 8.1% in the first and fifth waves of the MESA study, respectively. Smoking prevalence was higher and increased in the CNHS compared with the MESA study, concentrated in better-educated women in both years (RII: 0.34; 95% confidence interval [CI]: 0.17 to 0.68; and RII: 0.55; 95% CI: 0.34 to 0.89, respectively). In contrast, smoking decreased over time in the MESA study in all socioeconomic strata, although relative inequalities increased in both sexes (for women, RII: 2.32; 95% CI 1.36 to 3.97; for men, RII: 3.34; 95% CI 2.04 to 5.47). CBP prevalence in both periods was higher in the first and fifth waves of the MESA study (69.7% and 80.2%) compared with the 2003 and 2009 to 2010 CNHS samples (34.2% and 52.3%), but only for the MESA study RII, favoring the better educated, was it significant in both periods and sexes. Obesity inequalities for Chilean women decreased slightly between 2003 and 2009 as prevalence grew in the most educated (RII: 2.21 to 1.68; SII: 0.29 to 0.22, respectively); conversely, they increased for both sexes in the MESA study.

Conclusions: The study findings confirm that patterns and trends in prevalence, and absolute and relative inequalities vary by country, suggesting that context and cultural issues matters.

The prevention and control of noncommunicable diseases (NCDs) is a global priority, shared by countries of all income levels. In the Americas region, NCDs are the leading causes of preventable premature death and illness [1]. Their global burden and the significant inequalities in risk, disease status, and access to preventive and therapeutic services—within and between countries—are major challenges [2].

Effectively addressing the large and inequitable burden of NCDs demands accelerated national policy action through scaling up effective, evidence-based, and cost-effective individual prevention and control interventions, together with public health measures and wider health in

all policy approaches [1,3]. Because the contextual social determinants may differ widely, understanding these differences and generating national knowledge is critical to inform contextually relevant and effective NCD interventions and policies [3,4].

Our aim is to analyze educational inequalities in controlled blood pressure (CBP), obesity, and smoking in 2 studies in Chile and the United States, in 2 periods. Social inequalities in both countries are marked: Chile showed a Gini coefficient of 0.50, much higher than the Organization for Economic Cooperation and Development average (0.31) and that of the United States (0.38) [5].

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In Chile, cardiovascular disease (CVD) is the first death cause [6] and the third specific cause of disease burden [7]. National studies show that CVD and associated risk factors present social gradients, especially affecting the poor and the less educated [8]. Although Chile has claimed universal health coverage for decades, inequities in access to care persist in its segmented, but predominately public, health system [9].

National Health Objectives were set with specific goals related to the reduction of risk factors, CVD and health inequities [10]. The main policy response was the creation in 2005 of a rights-based system of health care guarantees to provide services for priority health conditions. Public health strategies were implemented, including national enactment of the World Health Organization Framework Convention on Tobacco Control and nutritional content and labeling. To monitor NCD targets, the Ministry of Health regularly carries out national health surveys [8].

In the United States, heart disease is the first death cause and the Black-White gap in heart disease death rate in favor of Whites persists, declining only from 15% to 12% in the 2000 to 2010 period [11]. The United States has implemented new policies to protect especially the disadvantaged. In 2010, the Affordable Care Act was enacted to facilitate and increase accessibility to preventive services and to increase insurance coverage rates, especially among minorities aiming to reduce health disparities [12,13].

This paper examines absolute and relative educational inequalities for CBP, obesity, and smoking in study samples of U.S. and Chilean adults 55 to 79 years of age, using data from 2 waves (2000 to 2002 and 2010 to 2012) of the MESA (Multiethnic Study of Atherosclerosis) study cohort sample (MESA1 and MESA5, respectively) and the 2003 and 2009 to 2010 Chilean National Health Survey (CNHS) samples. We hypothesize that the baseline comparison of health status and inequalities in both samples reflects health system performance for the period, whereas the comparison at the second point in time, might reveal the results of active follow-up in the MESA study, serving as a counterfactual scenario of universal effective coverage in the United States in contrast to health policy changes after the intervening equity-oriented Chilean reform.

METHODS

Study population

The MESA study is a longitudinal study designed to investigate risk factors for subclinical CVD among the 4 major race or ethnic groups in the United States. In 2000 to 2002, 6,814 participants were recruited (Exam 1), who were 45 to 84 years of age, were free of clinically diagnosed CVD, and self-identified as White, Black, Hispanic, or Asian Chinese from 6 U.S. communities. Recruitment used several population-based approaches [14]. MESA1 and MESA5 took place between July 2000 to August 2002 and April 2010 to January 2012, respectively. Participants provided information on their medical history, behavioral habits, and psychosocial factors. Anthropometric and

resting blood pressure (BP) was measured and blood samples were collected. The MESA study was approved by the institutional research board at each of the field centers, and all participants gave written informed consent.

The CNHS is a household survey of representative samples of the Chilean adult population, from all geographic regions, including urban and rural zones, repeated in 2003 and in 2009 to 2010, to determine the prevalence of priority adult health problems. Each survey selected participants from noninstitutional households, using a random, multistage, cluster design, stratified by area and region. Eligible adults (more than 16 years of age in 2003 and more than 14 years of age in 2009 to 2010) were randomly selected using the Kish method [15]. Procedures included a questionnaire about risk factors and self-reported health problems and symptoms; a trained nurse performed anthropometric measurements, BP readings, and blood and urine sampling. The Universidad Católica ethics committee reviewed and approved the study and all participants signed an informed consent.

In CHNS 2003 the response rate was 90.2% (n = 3,619), although biological samples were taken for 3,397 (93.9%). In CHNS 2009, the response rate was 75%; 12% were not contacted and 12% refused to participate. The total sample was 5,412 participants, with biological samples for 4,959 (91.6%) [8].

To ensure comparability, our analysis was restricted to respondents 55 to 79 years of age and excluded people with CVD. The CNHS samples consisted of 1,156 and 1,444 participants from the 2003 and 2009 to 2010 surveys, respectively. The MESA study samples included 4,579 subjects from MESA1 and 3,798 from MESA5.

Study variables harmonization

The MESA study and CNHS have similar protocols for physical measurements and blood samples. For comparison, we harmonized CNHS variables to the MESA study variable criteria and structures. We described median of lipids, creatinine, glucose, and systolic and diastolic BP. CBP was defined as BP <140/90 mm Hg. Current smoker status considered individuals who smoke cigarettes at present or a smoker who had quit under a year. Obesity was defined as body mass index ≥ 30 kg/m².

Education as a socioeconomic position measure

Education level is a measure that reflects family social status, mediated by education policies, and is a determinant of employment, income, and cognitive ability for self-care; also, it is a component of mechanisms associated with health and health care inequalities [16]. Education in the MESA study samples was regrouped as less than primary school, primary school completed, high school completed, and college and higher. For the CNHS, we used the variable study years to create the same categories.

Statistical methods

For CBP, smoking, and obesity, age-standardized prevalence was calculated using 5-year age groups, stratified by

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