Coronary Heart Disease and Risk Factors in Latin America

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ABSTRACT

Cardiovascular diseases are the leading cause of death in Latin America, with ischemic heart disease as the principal cause in most countries. Risk factors for cardiovascular disease are highly prevalent in the region, but there are international variations in the pattern and level of risk factors. Overweight and obesity are increasing. In the 2012 Mexican National Survey, overweight or obesity was found in 64.9% of men and 73% of women, and they were strongly associated with sedentarism. The most characteristic dyslipidemia abnormality in the region is low high-density lipoprotein cholesterol, followed by elevated low-density lipoprotein cholesterol and increased levels of triglycerides. National diabetes mellitus prevalence ranges from 2.8% to 9.4% and tobacco smoking from 12.8% to 42%. According to the INTERHEART (A Study of Risk Factors for First Myocardial Infarction in 52 Countries and Over 27,000 Subjects) data for Latin America, the highest attributable risks for myocardial infarction were related to abdominal obesity, dyslipidemia, and smoking.

Cardiovascular diseases (CVD) are the leading causes of death in the Americas, accounting for 33.7% of total mortality rates, with higher mortality values in Guyana, Trinidad and Tobago, and Venezuela, whereas Canada, Puerto Rico, and Chile exhibit the lowest values [1]. Within CVD, ischemic heart disease is the predominant form, with an adjusted mortality of 66.4 per 100,000 persons in Latin America and the Caribbean [2]. It is highly anticipated that this trend will continue due to population aging and the adoption of Western lifestyles that lead to increased sedentarism and obesity. These factors in turn contribute to increased rates of hypertension, dyslipidemia, and diabetes mellitus (DM) [3]. The objective of this paper is to review evidence about the major risk factors underlying ischemic heart disease in Latin America.

ASSOCIATION OF RISK FACTORS WITH ISCHEMIC HEART DISEASE IN LATIN AMERICA

Causal factors of acute myocardial infarction (AMI) were analyzed in Latin America as well as worldwide by the INTERHEART (A Study of Risk Factors for First Myocardial Infarction in 52 Countries and Over 27,000 Subjects) [4,5]. This study analyzed 15,152 cases of first AMI patients and 14,820 control subjects from 52 countries, of which 1,237 cases and 1,888 control subjects were from 6 Latin American countries (Argentina, Brazil, Colombia, Chile, Guatemala, and Mexico). Worldwide factors associated with AMI were dyslipidemia, smoking, psychosocial factors (such as depression and stress), hypertension, DM, abdominal obesity, and protective factors such as physical activity, diet rich in fruits and vegetables, and moderate consumption of alcohol.

In Latin American INTERHEART countries, former or current tobacco smoking, elevated waist/hip ratio, and apolipoprotein (apo) B/apo A-1 ratios were the most prevalent factors in control subjects. The strongest association with AMI, with an odds ratio (OR) of 2.8, corresponded to a history of hypertension and permanent stress. Periods of psychological stress were reported by 17% of control subjects and in 24.7% of cases, with an OR of 2.0 (95% confidence interval [CI]: 1.6 to 2.6, $p < 0.0001$). Daily consumption of fruits and/or vegetables and regular exercise had a protective effect, with an OR of 0.6 (95% CI: 0.5 to 0.8) and 0.7 (95% CI: 0.6 to 0.8), respectively (Table 1). No significant associations with socioeconomic status (i.e., education and income level), depression, or alcohol were seen. The combination of lack of daily consumption of fruits and/or vegetables and regular exercise together had an OR of 63 (95% CI: 23.7 to 168.0).

There were 2 previous Latin American publications devoted to quantifying the degree of association of risk factors with AMI. One study conducted in Argentina, Cuba, Mexico, and Venezuela reported an independent association between AMI and the following risk factors: total cholesterol; hypertension; smoking; and diabetes [6]. Unlike in INTERHEART, there were wide differences between countries. The second study, which was carried out in Brazil, reported associations of AMI and the following risk factors: smoking; high blood sugar levels; history of diabetes; waist/hip ratio; family history of heart disease; low-density lipoprotein cholesterol; and hypertension. Alcohol consumption had a significant protective effect [7]. Despite some differences, the 3 cited studies revealed that known, easily measurable, and controllable risk factors are responsible for most AMI in Latin America. Regional

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TABLE 1. INTERHEART Latin America: Prevalence of risk factors in the control group, OR, and PAR for male and female subjects combined

Risk factor	Prevalence in control subjects (%)	OR (95% CI)	PAR (95% CI)
Apo B/Apo A-1*	42.0	2.3 (1.8–9.4)	40.8 (30.3–52.2)
Tobacco†	48.1	2.3 (2.0–2.7)	38.4 (32.8–44.4)
Diabetes mellitus	9.54	2.6 (2.1–3.2)	12.9 (10.3–16.1)
Arterial hypertension	29.1	2.8 (2.4–3.3)	32.9 (28.7–37.5)
Waist/hip ratio	48.6	2.5 (2.0–3.1)	45.8 (35.8–56.2)
Depression	28.9	1.2 (1.0–1.4)	4.7 (1.4–13.9)
Permanent stress‡	6.8	2.8 (2.1–3.8)	28.1 (18.5–40.3)
Regular exercise	22.0	0.7 (0.6–0.8)	28.0 (17.7–41.3)
Alcohol	19.4	1.1 (0.9–1.3)	−3.2 (−18 to −11.7)
Daily consumption of fruit or vegetables	85.0	0.7 (0.6–0.8)	6.9 (3.35–10.5)

N = 3,125. Participant countries include the following: Argentina, Brazil, Colombia, Chile, Guatemala, and Mexico. For protective factors (diet, exercise, and alcohol), PAR correspond to the group without these factors. apo, apolipoprotein; CI, confidence interval(s); INTERHEART, A Study of Risk Factors for First Myocardial Infarction in 52 Countries and Over 27,000 Subjects; OR, odds ratio(s); PAR, population-attributable risk.

*First versus third tertiles.

†Never versus active and former smokers.

‡Never versus permanent.

Adapted with permission from Lanas et al. [5].

prevalence data on obesity, sedentarism, dyslipidemia, DM, and tobacco smoking will be analyzed here; arterial hypertension will be reviewed in a separate publication.

OBESITY

The World Health Organization (WHO) has defined normal weight as a body mass index (BMI) between 18.5 and 24.9 kg/m^2, overweight as BMI between 25 and 29.9 kg/m^2, and obesity as BMI ≥30 kg/m^2 [8]. Over recent decades, obesity has become a global epidemic, representing a major cause of disability and mortality [8,9]. It is estimated that by 2020, obesity and overweight will account for 57% of the disease burden worldwide [9]. Both obesity and overweight are associated with an increase in overall mortality [9,10]. Obesity has been estimated to annually account for 280,000 to 325,000 deaths in the United States [9], with CVD contributing significantly to these obesity-attributable mortality cases [8,11].

Although obesity is associated with other downstream cardiovascular risk factors, such as DM and hypertension, it is also an independent risk factor for CVD [12]. Body fat distribution is also an important risk factor for obesity-related health problems. Several studies have shown that the presence of abdominal obesity has been linked to coronary artery disease [4,13–15]. Even in coronary patients with normal BMI, the presence of abdominal obesity is directly associated with increased mortality [16,17].

Prevalence of obesity has reached alarming levels in some countries. In the United States, an overweight and obese population of 67% has been reported in adults ≥20 years [18]. Population growth and social development in Latin America has led to a demographic transition, increasing the frequency of obesity occurrence, which greatly differs among the countries of the region [9,11,19,20]. Over the last decades, Brazil experienced increased consumption of processed foods, with a rise in fat intake, specifically saturated fat, along with increased sodium and sugar intake [21]. This is likely a cause of an increased obesity prevalence—14.8% in the population >20 years in 2010—with the highest increase in both the lowest income quintile and in less-educated women [21]. In Mexico, the 2012 National Health Survey (NHS) revealed alarming figures, with a prevalence of overweight and obesity of 64.9% in men and 73% in women >20 years [22]. In Colombia in 2007, an estimated 32.2% were overweight and 13.7% were obese between 18 and 69 years of age [23]. In Argentina, 34.5% showed overweight and 14.6% obesity in persons older than 17 years, with an increase directly related to aging [24]. In Chile, prevalence rates of obesity reached 25.1% in persons older than 14 years, and they were higher in women, with a rate of 30.7% [25]. All of these prevalences are influenced by national age distributions and are not standardized, which limits comparisons. In several countries, the pattern of higher obesity occurring more in both lower socioeconomic levels and lower levels of education is repeated [22,24,25]. In the INTERHEART study, which was conducted in Latin America, an increased waist/hip ratio was associated with an increased risk of AMI, with an overall OR of 2.5 (95% CI: 2.0 to 3.14) and a higher OR of 4.1 (95% CI: 2.6 to 6.5) in women. It was the most prevalent risk factor for this population. This association was also higher than that found for other INTERHEART regions studied [5].

Weight reduction in obese subjects reduces the incidence of disease and various cardiovascular benefits may be achieved [26]. Health promotion efforts in Latin America have included nutrition and physical activity promotion programs, but further work is needed to control this epidemic [21,23].

PHYSICAL INACTIVITY

Physical activity is defined as any bodily movement produced by skeletal muscles that result in energy expenditure [27]. Physical inactivity is an independent risk factor for AMI [4] and other cardiovascular conditions.

Physical exercise, when part of work and leisure-time activities, has a beneficial effect in the prevention of ischemic heart disease, in lowering overall mortality, and in improving quality of life [28]. Despite the known benefits of exercise, physical inactivity is common in the general population. In 2009, reports on Latin America documented that only a 14.7% of the Brazilian population was physically active [21]. In Uruguay, the National Survey of Risk Factors reported that 35.1% of the population >25 years exhibit low levels of physical activity [29]. In Venezuela, 70% of sedentarism has been documented in metropolitan areas [30], whereas in Argentina an estimated 46.2% of the population has a low level of physical activity, according to NHS 2005 [24]. In Chile, the 2009 to 2010 NHS documents a prevalence of multidimensional sedentarism of 27.1% and 88.6% of free-time sedentary activities [25]. In Mexico, 17.4% of the adult population is considered physically inactive [22].

Prevalence is an indicator of the frequency of a risk factor, and it is important to know by how much this risk factor increases the occurrence of disease in a particular population. In the INTERHEART study, the population-attributable risk (PAR) of coronary heart disease due to sedentary behavior in Latin America and the Caribbean was 7.1%, ranging from 2.7% in Guatemala to 11.3% in Argentina, high levels when compared with 3.9% in Africa, 5.5% in Europe, and 3.2% in Southeast Asia. Additionally, it is estimated that life expectancy would increase by 0.82 years if the Latin American population were to change its sedentary lifestyle, thus becoming the region that would benefit most from increased levels of physical activity [31].

Considering how rare it is in contemporary populations to have healthy levels of energy expenditure, it is worth asking what the factors that promote sedentary behavior are. These factors include those belonging to the psychosocial and socioeconomic dimension and those associated with the built environment [32]. Urbanization in developing countries is often associated with poor urban, social, environmental, and labor infrastructures [33], thus hindering an active lifestyle because of increased mechanization and reduced safety. Factors related to climatic and seasonal conditions also lead to low average physical activity levels in some populations.

Consequently, it is important to promote the message that healthy adults ages 18 to 65 years need moderate-intensity aerobic activity for at least 30 min, 5× a week, or vigorous-intensity physical activity for at least 20 min, 3× a week, along with activities that maintain or increase muscular strength and endurance, 2× a week [34]. Although this may look like a difficult task, there are interventions that have proven effective, for example, exercise sessions in health centers, home sessions, group walks, telephone monitoring, and incentives [35].

DYSLIPIDEMIA

Hypercholesterolemia plays a predominant role in the initiation and development of atherosclerotic lesions. A high prevalence of dyslipidemia has been documented in various NHS and national/regional cross-section studies. The most common alteration is the presence of reduced levels of high-density lipoprotein cholesterol (≤40 mg/d). Chile's NHS reported reduced levels of high-density lipoprotein cholesterol in 48.4% of men and 30.6% of women [25]. Prevalences were 63.0% in Colombia [23], and 60.5% in Mexico [22] in their respective NHS. In a study conducted in various Peruvian cities, low high-density lipoprotein prevalence rates were 40% in women and 38% in men [36]; these values are substantially higher than those observed in the United States (i.e.,18.9%) [37]. The second most commonly encountered dyslipidemic condition is high low-density lipoprotein cholesterol levels (≥200 mg/dl). In Mexico, the NHS reported a prevalence of 43.6% [22], whereas in Chile, 38.5% of men and 39% of women were documented [25]. The Chilean survey also revealed levels >240 mg/dl in 11.6% of the population; these results are similar to those observed in Colombia [8%], but lower than those observed in the United States (i.e., 15%) [37]. In Brazil, total cholesterol levels >190 mg/dl were found in 22% of adults and one-third of those were adults >45 years living in cities with more than 100,000 inhabitants [21]. High triglyceride levels constitute the third most frequent abnormality. The Mexican NHS registered hypertriglyceridemia (≥150 mg/dl) in 31.5% of the respondents, whereas in Chile, it was found in 31%, with 17% of individuals with triglycerides >200 mg/dl.

Differences in the prevalence of dyslipidemia between cities are commonly encountered in the countries of Latin America. For example, Bogotá has a high prevalence, whereas the Atlantic, Pacific, Orinoquian, and Amazonian regions in Colombia exhibit significantly lower prevalence [23]. A high percentage of people in Latin America do not know their blood lipid levels; only about one-half of adults in the Argentinian NHS reported to have undergone cholesterol screenings [24]. Cholesterol testing was more frequently performed in capital cities and was closely related to individual higher socioeconomic or educational levels, unlike the NHS in Spain, which reports that 87.3% of people ages 35 to 74 years had their cholesterol measured in the last 5 years [38]. In Mexico, only 8.6% of patients with elevated cholesterol knew their diagnosis [23], whereas in Chile about 18.8% of the population was reported to have been diagnosed with high cholesterol by a physician, nurse, or other health professional [26]. In the CARMELA (Cardiovascular Risk Factor Multiple Evaluation in Latin America) study, which included 11,550 people ages 25 to 64 years, who lived in 7 Latin American

cities, mostly capital cities, frequency of diagnosed hypercholesterolemia was relatively low (41%). Eighty-eight percent of the subjects were not under treatment and among those receiving drug therapy, only 52% had achieved the proposed targets [39].

DIABETES MELLITUS

Diabetes mellitus prevalence has been increasing over recent decades, and it is associated with changes in diet, an increase in obesity, and a sedentary lifestyle. It has reached epidemic levels worldwide, with prevalence between 5% and 19%, depending on the population studied [20,40–45]. In 2010, it was estimated that 18.8 million people in the United States had been diagnosed with DM and about 7 million had undiagnosed diabetes [46]. Its frequency increases in relation to age and BMI, which is lower in subjects with higher income and educational levels [45]. A notorious increase in child and adolescent diabetes, closely associated with lifestyle changes, has been observed lately. In some population groups, the prevalence of diabetes is particularly high, as in the case of Latin subjects living in the United States (age-adjusted prevalence: 16.7% in men and 17.2% in women), with differences depending on geographic origin: 10.1% in those of South American origin; and 19.3% in those of Mexican origin [47]. In Latin America, the overall estimated prevalence of diabetes is 5%, much lower than that of Latin subjects living in the United States, which reflects the importance of lifestyle in the development of this disease [42,46]. However, differences have been observed among the Latin American countries. Chile, with a national prevalence of 9.4% in the population >14 years, is part of the group of countries exhibiting high frequency of DM, and prevalence is particularly higher in women [25]. In Mexico, in 2012, diabetes was found in 9.2% of the population >20 years, showing a significant increase compared with findings reported in previous years [22]. In Argentina, 8.5% of the population >18 years reported diabetes or high glucose levels [24]. Brazil was found to be at an intermediate level, with a self-reported diabetes frequency of 5.3% in those >20 years [21]. Nevertheless, previous studies applying glucose tolerance test in addition to the report, reported diabetes in 7.6% of the study population [21]. Colombia and Peru are among countries with the lowest diabetes prevalence rates. Colombia exhibited a presence of self-reported diabetes of 3.5% in individuals between 18 and 69 years [23], whereas Peru reported an estimated diabetes rate of 2.8% in 2006 in the population >20 years [48]. The presence of DM in Latin America is more common in less-educated subjects [22,24,25]. DM prevalence in Chile in the group with <8 years of schooling reached 20% [25].

Diabetes is a well-known cardiovascular risk factor that increases event incidence rates by 2× to 3×, independent of other risk factors [49]. The main causes of death in patients with diabetes are CVD, accounting for 44% of deaths in those with type 1 DM and 52% in those with type 2 DM [50]. Mortality due to CVD associated with DM is higher in women than in men, with a relative risk of 2.6 (95% CI: 2.1 to 3.3) versus 1.9 (95% CI: 1.5 to 2.3, $p = 0.045$), respectively [51]. The INTERHEART study demonstrated that diabetes is a risk factor of AMI in Latin America, with an OR of 2.6 (95% CI: 2.1 to 3.2) and PAR of 12.9 (95% CI: 10.3 to 16.1), which is similar to that found in other regions studied. An increased association of diabetes with infarction in women was reported, with a significant PAR greater than that found for men [5]. In many Latin American countries, healthy eating, promotion of physical activity, and lifestyle change programs have been implemented [21,23,25]. This is a significant effort, because these behavioral changes have proved effective in preventing the development of diabetes [52–55].

TOBACCO SMOKING

Tobacco smoking has been shown to cause a variety of diseases and accounts for 50% of preventable deaths in smokers, one-half of them due to cardiovascular disease. The harmful effects of tobacco smoke in active and former smokers are directly related to the amount of cigarettes smoked per day as well as to smoking duration. Moreover, evidence has shown that passive smokers are also at increased risk levels of an adverse health outcome. For instance, a woman exposed to spousal smoking is 30% more likely to experience a cardiovascular event, which is the same health risk experienced by those exposed to workplace passive smoking [56].

Despite the known harmful effects of tobacco smoking and the various smoke-free campaigns and policies that have been implemented in different regions of the world, smoking prevalence is still unacceptably high. According to Latin American reports, prevalence rates of smoking (defined as having smoked >100 cigarettes and currently smoking) range from 12.8% in Colombia [23], 15.5% in Brazil [21], and 19.9% in Mexico [22], up to 32.7% and 33.4% in Uruguay [33] and Argentina [24], respectively, and as high as 42% in Chile [25]. Nevertheless, a slight decrease in rates over the years in Latin America has been documented.

In all countries, smoking prevalence is higher among men than among women, a gap that has narrowed over the years. It is noteworthy that the health risk associated with smoking is proportionally higher in women, especially if they are taking oral contraceptives [56]. A slight association between tobacco smoking and socioeconomic and educational status has been observed.

The benefits of smoking cessation have been widely studied. Several interventions for smoking cessation, both individually and at the population level have already been implemented. In an individual context, motivation and professional assistance appear as vital factors to be taken into account. Any intervention is more successful if carried out at the time of diagnosis of an associated disease or when other therapeutic interventions are being carried out

(such as angioplasty or coronary bypass). Within individual interventions, the nonpharmacological strategies, such as individual or group behavioral interventions [57,58], along with drug treatments, such as nicotine replacement therapy, varenicline, and bupropion [59], have to be cited.

At the population level, the WHO Framework Convention on Tobacco Control should be highlighted. It incorporates 2 types of measures: 1) measures related to the reduction of demand for tobacco (including actions over prices and taxes, and others such as protection from exposure to tobacco smoke and packaging and labeling of tobacco products); and 2) measures related to the reduction of tobacco supply (such as control of illegal trade in tobacco products and sales to and by minors) [60]. As of October 2010, the most significant achievements in Latin America have been observed in the implementation of Articles 11 and 8 [61]. The Tobacco Control Report for the Region of the Americas shows that 28 countries have ratified the Framework Convention on Tobacco Control and only 4 have signed it. Table 2 shows the

TABLE 2. Countries in Latin America that have ratified, or signed, the convention and how the principal measures for tobacco control are being implemented

Countries that have ratified the WHO FCTC	Article 6	Article 8	Article 11	Article 13
Antigua and Barbuda	None	1	No	0
Argentina*	Ad valorem	7	Yes	9
Bahamas	Ad valorem	0	Yes	1
Barbados	Specific excise	8	No	0
Belize	Specific excise	0	No	0
Bolivia	Ad valorem	4	Yes	5
Brazil	Specific excise	1	Yes	7
Chile	Ad valorem	3	Yes	9
Colombia	Specific excise, ad valorem	8	Yes	13
Costa Rica	Ad valorem	1	Yes	0
Cuba*	Not available	4	Yes	0
Dominica	Specific excise	0	No	0
Ecuador	Ad valorem	8	Yes	10
El Salvador*	Specific excise, ad valorem	8	Yes	13
Grenada	Ad valorem	0	No	0
Guatemala	Ad valorem	8	Yes	1
Guyana	Ad valorem	3	Yes	0
Haiti*	Without information	0	No	0
Honduras	Specific excise	8	Yes	5
Jamaica	Specific excise	0	Yes	1
Mexico	Specific excise, ad valorem	2	Yes	6
Nicaragua	Specific excise	6	Yes	4
Panama	Ad valorem	8	Yes	13
Paraguay	Ad valorem	2	Yes	0
Peru	Specific excise, import duties	8	Yes	2
Saint Kitts and Nevis	Ad valorem	0	No	0
Saint Lucia	None	0	No	0
Saint Vincent and the Grenadines	Specific excise	0	No	0
Suriname	Specific excise	0	No	0
Trinidad and Tobago	Specific excise	8	Yes	3
Uruguay	Specific excise	8	Yes	11
Venezuela	Ad valorem	8	Yes	6

Article 6: Prices and taxes. Article 8: Smoke-free environments: number (of 8 possible) of smoke-free environments established; type of smoke-free environments: health-care facilities, educational facilities except universities, government facilities, indoor offices, restaurants, pubs and bars, public transportation. Article 11: Health warnings (specific warnings mandated by law). Article 13: Bans of tobacco, promotion, and sponsorship: number (of 13 possible) of media (national TV and radio, international TV and radio, local magazines and newspaper, international magazines and newspaper, billboard and out-door advertising, point of sale, Internet) or forms of direct and indirect advertisement (free distribution by mail or other means, promotional discounts, nontobacco products identified with tobacco brand names, brand names of nontobacco products used for tobacco products, appearance of tobacco products in TV or film, tobacco-sponsored events). FCTC, Framework Convention on Tobacco Control; WHO, World Health Organization.

*Countries that have signature only.

countries in Latin America that have ratified or signed the convention and the implementations for the principal measures (Table 2).

DISCUSSION

The impact of a risk factor in the population depends on its prevalence and the strength of association of the risk factor with the disease outcome, measured by relative risk or OR. In INTERHEART, the strength of association of risk factors with AMI was similar in all regions of the world. Therefore, it is mostly the differences in prevalence among regions that explains differences in PAR. Prevalence of a risk factor in the population is represented in INTERHEART, albeit not precisely, by the prevalence in the control group.

Obesity has become a major health problem in Latin America; it has reached prevalences over 25% in Mexico and Chile and near 15% in Argentina, Brazil, and Colombia. In the INTERHEART study in Latin America, the highest PAR, unlike that observed in the rest of the world, was due to abdominal obesity: 45.8% (95% CI: 35.8 to 56.2). There was a waist/hip ratio >0.95 in men and >0.90 in women in 46.8% of control subjects in Latin America and only in 33% of those in other countries. In a systematic analysis of health examination surveys worldwide, after standardizing for population age structure, prevalence of obesity and overweight in Southern and Central Latin America were among the highest in the world in 2008 [62].

Dyslipidemia, assessed by the apo B/apo A-1 ratio, had the second place PAR in the region: 40.8% (95% CI: 30.3 to 52.2) in the INTERHEART study; prevalence of control subjects in the upper quintile of apo B/apo A-1 ratio was 27.1% in Latin America, which is similar to that for South East Asia, lower than that for the Middle Eastern countries, but higher than that for all other regions of the study. Current and former smoking was the third leading cause of AMI, according to PAR: 38.4% (95% CI: 32.8 to 44.0). Important differences in prevalence were observed in the region. The lowest prevalences—below 20% in Colombia, Brazil, and Mexico—were similar to those observed in North American and some central African countries. Higher prevalences—>30% in Argentina, Chile, and Uruguay—were similar to those reported in the southern part of Europe and India. Still, smoking prevalence in Latin American country sites was lower than the smoking prevalence observed in Eastern Europe, Russia, and China [63,64].

Priorities to reduce the burden of CVD in the Americas have been defined by Pan American Health Organization and include the following: public policy and advocacy; health promotion and disease prevention related to tobacco use; harmful levels of salt intake; lack of healthy eating; lack of physical activity; and alcohol use and integrated control of noncommunicable diseases and their risk factors with major emphasis on hypertension [65]. Among the most-promising recent important steps taken by countries in Latin America are the advances in tobacco control in Uruguay. In March 2006, Uruguay became the first Latin American country to adopt a 100% smoke-free national legislation. Two years after the smoke-free policy was enacted, hospital admissions for AMI fell by 22% [66]. Another advance was the provision of free access to medications for hypertension and DM in Brazil since 2011 [67]. In Chile, new laws guarantee health-care access and quality for all the population with conditions such as DM, hypertension, AMI, or stroke, which may be a factor in the reduction of in hospital mortality in myocardial infarction [68].

SUMMARY

CVD risk factors are highly prevalent in Latin America. Prevalence varies by sex, education, and socioeconomic level. A more intensive and integrated approach to individual and population-level prevention is needed to reduce the burden of CVD in the region. Lessons from recent advances in CVD control in specific countries should be learned and implemented by other countries in Latin America.

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