

CLINICAL RESEARCH

Some socioeconomic characteristics of acute myocardial infarction patients in the *Instituto Nacional de Cardiología Ignacio Chávez*. Comparison of two decades: 1954-1964 and 1997-2007

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KEYWORDS

Myocardial Infarction;
Epidemiology;
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diseases; Mexico.

Abstract

Objective: The purpose of this study was to compare some social and economic conditions of patients with myocardial infarction (AMI), admitted to the Instituto Nacional de Cardiología Ignacio Chávez (INC-ICh), in two decades: 1954-1964 vs. 1997-2007. **Study design:** an observational and retrospective study was carried out.

Method: All discharged patients between 1997-2007 with AMI diagnosis according to International Statistical Classification of Disease 10th Revision codes I 21 - I 21.9 were included. Information about age, sex, marital status, socioeconomic level, occupation and current address were obtained from the patient's file. The findings were compared with a previous published paper from 1954-64.

Results: The number of AMI cases increased five times between both decades, and significant changes were observed in occupational activity and in the socioeconomic level.

Conclusions: Some social and economic factors have changed over the years; however, age and gender of patients with AMI are variables that did not show significant changes: most young patients are male, and women are older when they have a first AMI.

PALABRAS CLAVE

Infarto agudo del
miocardio; Epidemiología;
Transición epidemiológica;
Enfermedades crónicas;
México.

Algunas características socioeconómicas de pacientes con infarto agudo del miocardio del Instituto Nacional de Cardiología Ignacio Chávez. Comparación de dos decenios: 1954-1964 y 1997-2007

Resumen

Objetivo: Comparar algunas características socioeconómicas de los pacientes con infarto agudo del miocardio (IAM), atendidos en el Instituto Nacional de Cardiología Ignacio Chávez, en dos decenios: 1954-1964 vs. 1997-2007.

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Métodos: Se incluyó a todos los pacientes egresados entre 1997 y 2007 con diagnóstico de IAM de acuerdo a la Clasificación Estadística Internacional de Enfermedades y Problemas Relacionados con la Salud, 10^a Revisión códigos I 21 a I 21.9. La información sobre edad, sexo, estado civil, clasificación socioeconómica, ocupación y domicilio actual se obtuvo de los expediente de los pacientes. Esta información se comparó con un estudio publicado que se llevó a cabo entre 1954 y 1964.

Resultados: El número de pacientes con diagnóstico de IAM aumentó cinco veces entre dos decenios, se identificaron cambios significativos con respecto a la ocupación y clasificación socioeconómica.

Conclusiones: Algunos factores sociales y económicos han cambiado, sin embargo, la edad y sexo de los pacientes con IAM son variables que no muestran cambios significativos: la mayoría de los pacientes jóvenes eran hombres.

Introduction

Cardiovascular diseases (CVD) presentation patterns have changed over the last century. During the first decades of the 20th century CVD were caused mainly by infections and/or parasitic etiologies, such as rheumatic fever and syphilis,¹ treatment was based on palliative measures until the discovery of antibiotics² and other drugs around the middle of this century; with the use of these drugs, as well as other health measures, the frequency of cardiovascular infectious diseases began to decrease.

During the second half of last century a different scenario started to arise, an increasing rate in the morbidity and mortality related to coronary heart disease, was observed along with an increased prevalence of some major cardiovascular risk factors,³ like hypertension,⁴ type 2 diabetes⁵ and obesity.⁶ Both situations have also been observed in Mexico.^{1,7}

An epidemiological study of acute myocardial infarction (AMI)⁸ patients admitted at the *Instituto Nacional de Cardiología Ignacio Chávez* (INC-ICh) between 1954 and 1964 was published; it described the socioeconomical conditions of patients at that time. The purpose of the present study is to compare these conditions in patients admitted at the Institute forty years latter (1997-2007) with the same diagnosis.

Method

The present study included the first AMI of all discharged patients seen at the INC-ICh between 1997 and 2007. Diagnosis of AMI was established according to the International Statistical Classification of Disease and Related Health Problems 10th Revision⁹ codes I 21 to I 21.9. Age, gender, marital status, socioeconomical level, occupation and current address were obtained from each patient personal record.

Socioeconomical levels from both decades were reviewed by a Certified Social Worker and an equivalent classification was established in order to compare classifications used in each decade.

Admission and attention criteria, for patients with AMI from both decades are based on the *Ley General de Salud* and therefore are comparable: Social Security and High Income Patients are given emergency medical care, then the former are send to the appropriate hospital or clinic to

continue their treatment. The AMI diagnosis was based on clinical findings, ECG changes and enzyme determinations in both decades.

A total of 5872 patients were identified; 34 patients, (15 women and 19 men) 14 to 30 years old were eliminated from the analysis because they had other cardiovascular diseases like: coronary aneurism or Kawasaki disease in three cases, congenital heart diseases five cases, drug addiction (cocaine) four cases, antiphospholipid syndrome three cases, Takayasu disease two cases, 11 unknown etiology cases, family hypercholesterolemia in two cases and four with different diseases (Pulmonary thromboembolism, pulmonary hypertension, pericarditis, and Aortic stenosis).

A data base was constructed with current data, and the statistical analysis was carried out with Stata software version 8.0 for Windows. Mean and standard deviation of patients' age, for all patients and by gender were estimated, as well as the proportion of each gender, marital status (married, including living together, divorced, single, and widower), socioeconomical level (I, II, III, IV, and V according to current INC-ICh classification, lowest income patients are classified as I to III, medium class as IV, and class V are the highest income patients), occupation (free-lance professionals, executives, office-worker, commerce worker, skilled worker, unskilled worker, farmer, retired, students, and housewife), and residence location at the AMI occurrence (state of the Mexican Republic). Data from 1954-1964 decade were taken from a previous published paper.⁸

Data from both decades were compared with aggregated statistical methods; *chi square test* was used to compare qualitative variables such as socioeconomical level, marital status, occupation and residence location. Quantitative variables were compared between groups with Student T test. Statistical significance was set at a *p* value equal or smaller than 0.05. The study was approved by the Institutional Ethics and Research Committees

Results

The number of AMI patients in the INC-ICh in the 1997-2007 decade (5,838) increased five times in relation to 1954-1964 decade (1171).⁸ No differences were identified in the proportion of women (22.3% [1954-64])⁸ vs. 20.3%

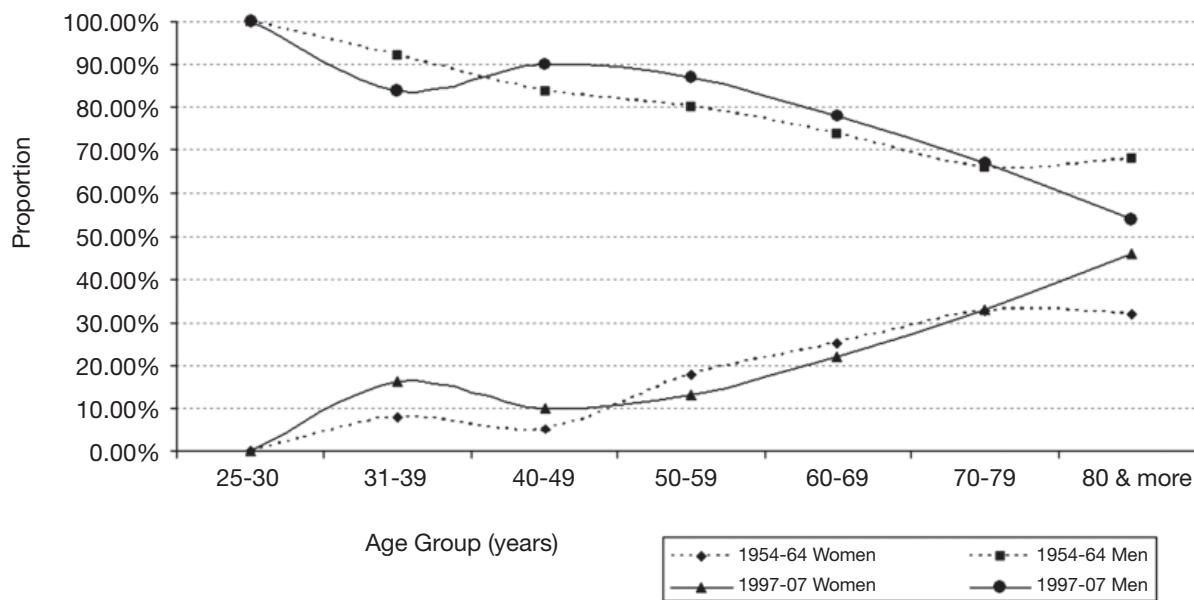


Figure 1. Comparison of proportion between women and men by age group.

[1997-07]) and men (77.7% [1954-64] vs. 79.7% [1997-07]) and, in the average age in men 57.1 years (1954-64) vs. 58.4 years (1997-07), the average age in women showed that women from the 1954-64 decade (61.2 years) were younger⁸ than women from 1997-07 decade (65.4 years); however, AMI was diagnosed in younger women in the 1997-07 decade (31 years old) than in the 1954-64 (36 years old).⁸ The youngest male in both decades had similar age (25 years old [1997-07] vs. 24 years old [1954-64]).⁸

Analysis of the proportion of women and men with AMI by age showed that in both studies the number of young men, between 25-30 years, was larger than the number of women; and this tendency continued until the women reached the 7th decade of life (between 60-69 years); at this time the proportion of men started to decrease (29.4%) in relation to women (26.4%), in the 80th decade when the number of AMI cases in women (28%) was twice the observed in men (14%) and in the 90th decade, there were three women (12%) per each men (3.7%) (Figure 1).

The distribution of male patients' occupational activity showed significant differences between the studied decades. While most patients were traders or skilled-workers in the 1954-64 decade,⁸ the majority of patients in the 1997-07 decade were retired, followed by skilled-workers. In the 1997-07 decade most women were housewives (75.3%), but this information was not available for the 1954-64 decade⁸ (Figure 2).

Socioeconomical level showed that in the 1954-64 decade⁸ the largest proportion of patients belonged to the classes II and V, the former included low income patients while the class V included high income patients. In the 1997-07 decade, the majority of patients were classified as class I of II, both include low income patients, these differences were statistical significant ($p < 0.0001$), (Figure 3).

In relation to the marital status the largest proportion of women and men in both decades were married, however, two times more men were in this status than women. Most women in both decades tend to stay married or were widows, nevertheless, single and divorced in the 1997-07 decade were 1.6 and 3.7 more frequent than in the 1954-64 decade.⁸ In the group of men, divorce increased 1.7 times between decades. These differences were statistical significant ($p < 0.0001$).

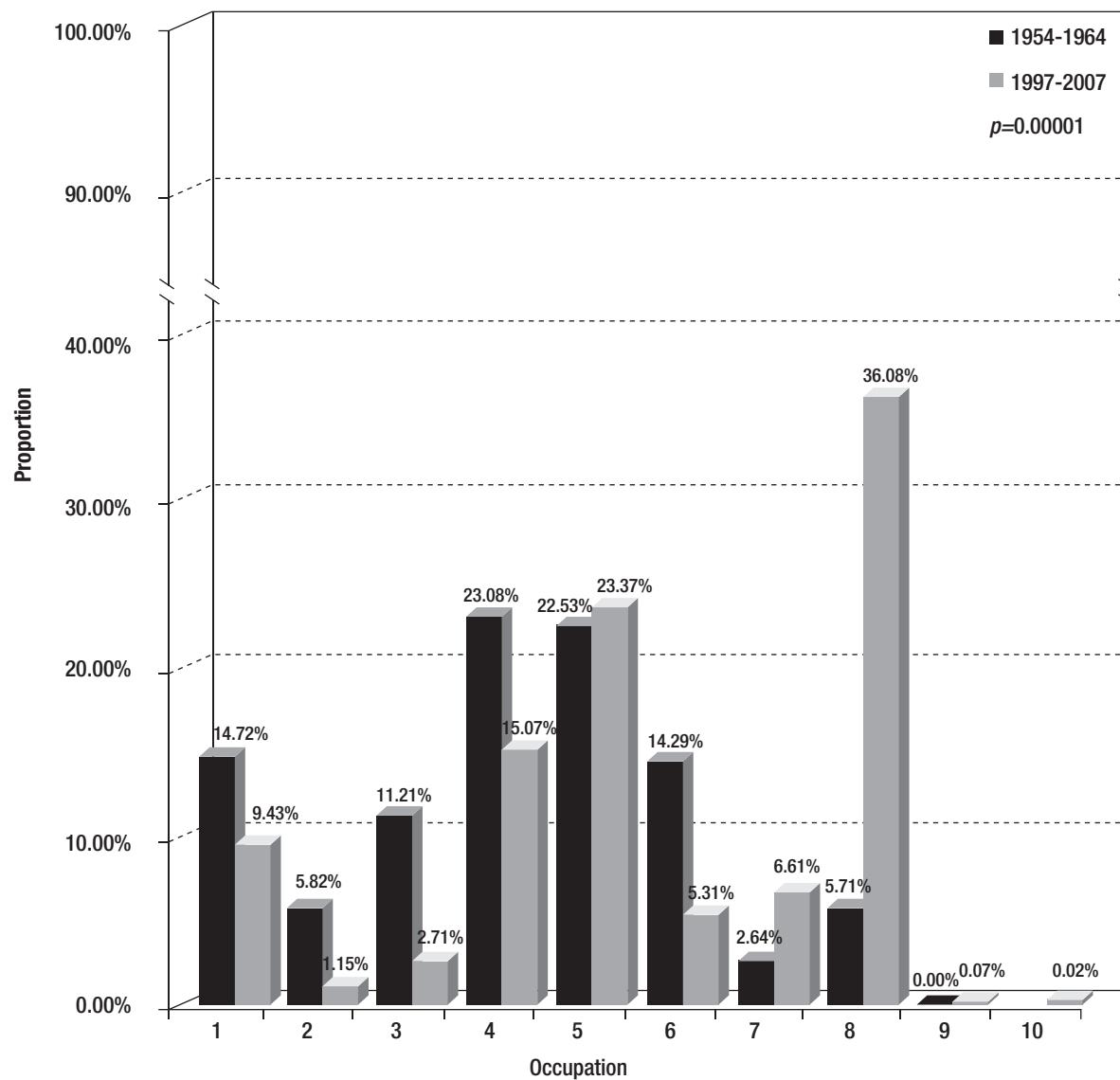
Most patients from both decades were living in Mexico City at the occurrence of the AMI (81.12% in 1954-64⁸ and, 99% in 1997-2007).

Discussion

This study compares some socioeconomical characteristics of AMI patients treated at the INC-ICh in two decades 40 years apart; the most important finding was that the number of AMI patients increased five times in these four decades even though the number of ward beds is almost the same.

Changes in the occurrence of myocardial infarction could be partially explained by demographic variations like the fact that the Mexican population has tripled between 1950 (25 millions) and 2000 (97.5 millions) and approximately one third of the population lives in Mexico City Metropolitan Area.¹⁰ Life expectancy has also increased from 49 to 75 years, the death rate of children under one year has decrease seven times since 1930 (from 178 to 24 per each 1000 new born)¹¹ and the global fecundity rate decreased from 7.3 to 1.8 children per mother.¹²

Gender¹³ and age¹⁴ are two variables closely related to AMI. There are marked differences between genders, it is well known that men have higher incidences of AMI than women, and that these differences are more important at younger ages,¹⁵ and as the women reaches the menopause



1. Free-lance professionals; 2. Executives; 3. Office workers; 4. Commerce worker; 5. Skilled workers; 6. Unskilled workers; 7. Farmers; 8. Retired; 9. Students; 10. Housewives

Figure 2. Occupational activity in male myocardial infarction patients.

these differences become smaller until the incidence is almost the same between the seventh and eighth decade

In our study, no differences were identified between patients from both decades, in relation to gender, the proportion of women and men that were admitted in 1954-64⁸ and 1997-07 were almost the same; however, the age of women at the time of diagnoses was younger in 1997-07 than in 1954-64;⁸ further more, the proportion of women by age showed a similar tendency in both decades, the frequency of women diagnosed with AMI increased after the menopause, and, when women reached the 80th decade of life the proportion of women admitted with AMI was larger in 1997-07 than in 1954-64,⁸ and larger than in men.

The urbanization and industrialization process, have a direct impact on the lifestyle, and on the occupational

activities which also showed a different behavior between both studies. While in 1954-64⁸ most male patients worked in commerce (23%) or were skilled workers (23%), in 1997-2007 they declared themselves to be self retired (36%). Many social aspects, like the occupational activities, the income and the education level are strongly associated among them.¹⁶ A higher education level gives better occupational opportunities and as a consequence the income increase. In 1954-64 patients with AIM treated at the INC-ICH were divided in two occupational activities, two socioeconomical level and in two educational levels⁸ since in 1950, 44% of the Mexican population was illiterate, today only 9% are in this situation, which could be represented by the skilled workers with a low income, and may be the traders group was a mixture of middle and

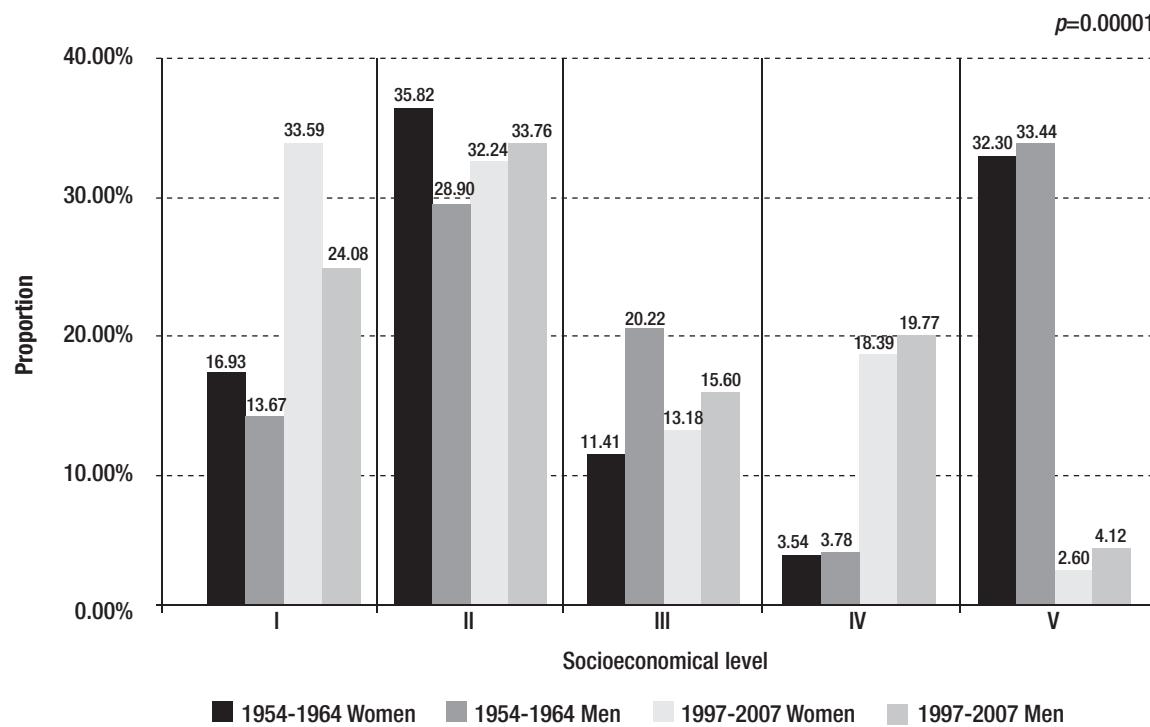


Figure 3. Socioeconomical level of myocardial patients.

high social class with at least primary education in 50% of this group and university education in the other 50%.

Socioeconomical level also showed significant differences between the two studied decades, in 1954-64⁸ patients with AMI were divided in two socioeconomical levels in a similar percentage, low income and high income; in the second decade, most patients (60%) were of very low or low income, this shows that the prevalence of this disease is related to social classes. Some hypothesis can be mentioned to explain these findings: adverse lifestyle such as nutritional habits, sedentary, and smoking among other have affected all socioeconomical levels, in developed countries, these adverse lifestyles are less common among high income population which may explain the decrease on the incidence of CHD in those countries^{17,18} but not in Mexico. In terms of medical care high income patients now have access to private care mostly through medical insurances (personal or as an employee) in which coronary care units (CCU) are now available. In 1954-64⁸ treatment of AMI was given in the general wards of hospital, even at the INC ICh, in which the CCU was inaugurated in 1969,

In developed countries the educational level as a measured of social and economical opportunities, has been related to morbidity and mortality, people with more educational level have lower death rates than those with less education,^{19,20} this have change over the years, around 1950 these countries had similar or probably higher morbidity and mortality rates, especially from cardiovascular disease, in higher social classes than lower ones,²¹ there was suggested by Morgestern that the education and the

CHD mortality relationship will vary depending upon a society's progress towards "modernization".²² In Mexico, morbidity and mortality is unevenly distributed depending on the wealth distribution, the educational level, the access and quality of health services.

Conclusions

The trends and patterns of disease may be determined by multiple factors, such as the personal once like physiological mechanisms, genetic information, and metabolism, but an important roll is played by socioeconomical factors which can make a difference among people from the same country living in different locations, or even increase the presentation of a some disease in certain socioeconomical levels. In this study social and economical factors showed significant differences among AMI patients treated at the INC-ICh.

References

1. Chavez I. The incidence of heart disease in Mexico. A study of 2400 cases of organic heart disease. Am Heart J 1942;34:88-89.
2. Fleming A. Antibiotics. Med Illus 1953;7:285-288.
3. Johnson CL, Rifkind BM, Sempos, et al. Declining serum total cholesterol levels among US adults. The National Health and Nutrition Examination Surveys. JAMA 1993;269:3002-3008.
4. Hajjar I, Kotchen TA. Trends in prevalence, awareness, treatment, and control of hypertension in the United States. 1988-2000. JAMA 2003;290:199-206.
5. Harris MI, Flegal KM, Cowie CC, et.al. Prevalence of diabetes, impaired fasting glucose, and impaired glucose tolerance in U.S.

adults. The Third National Health and Nutrition Examination Survey, 1988-1994. *Diabetes Care* 1998;21:518-524.

6. Hedley AA, Ogden CL, Johnson CL, et al. Prevalence of overweight and obesity among US children, adolescents, and adults. 1999-2002. *JAMA* 2004;291:2847-2850.
7. Chavéz Domínguez R, Ramírez Hernández JA, Casanova JM. La cardiopatía coronaria en México y su importancia clínica, epidemiológica y preventiva. *Arch Cardiol Mex* 2003;73:105-114.
8. Gorodezky M, Cádernas-Loaeza M, Cavazos-Ramirez J. Epidemiología del infarto del miocardio en los enfermos del Instituto Nacional de Cardiología de México. *Arch Inst Cardiol Mex* 1967;37:102-111.
9. Pan American Health Organization (PAHO)/ World Health Organization (WHO). International Classification of Diseases and Related Health problems. 10th revision (ICD-10). Washington D.C: PAHO/WHO 1995, Scientific Publication No. 554.
10. INEGI. Censos de población y vivienda 1950-2000, 1995 y 2005.
11. CONAPO. Evolución de la mortalidad y la esperanza de vida. En: La población de México en el nuevo siglo. Ed. CONAPO. México D.F. 2001;pp:23-31.
12. CONAPO. Evolución de la mortalidad y la esperanza de vida. En: La fecundidad y la planeación familiar en el marco de la salud reproductiva. Ed. CONAPO. México D.F. 2001;pp:33-70.
13. Bonarjee VV, Rosengren A, Snapinn SM, et al. OPTIMAAL study group. Sex-based short- and long-term survival in patients following complicated myocardial infarction. *Eur Heart J* 2006;27:2177-2183.
14. Anderson RE, Pfeffer MA, Thune JJ, et al. High-risk myocardial infarction in the young: the VALsartan In Acute myocardial infarction (VALIANT) trial. *Am Heart J* 2008;155:706-711.
15. Jousilahti P, Vartiainen E, Tuomilehto J, et al. Sex, age, cardiovascular risk factors, and coronary heart disease: a prospective follow-up study of 14 786 middle-aged men and women in Finland. *Circulation* 1999;99:1165-1172.
16. Davey Smith G, Neaton JD, Wentworth D, et al. Socioeconomic differentials in mortality risk among men screened for the multiple risk factor intervention trial: White men. *Am J Public Health* 1996;86:486-496.
17. Ford ES, Ajani UA, Croft JB, et al. Explaining the decrease in U.S. deaths from coronary disease, 1980-2000. *N Engl J Med* 2007;356:2388-2398.
18. Hardoon SL, Whincup PH, Lennon LT, et al. How much of the recent decline in the incidence of myocardial infarction in British men can be explained by changes in cardiovascular risk factors? Evidence from prospective population based-study. *Circulation* 2008;117:598-604.
19. Liu K, Cedres LB, Stamler J, et al. Relationship of education to major risk factors and death from coronary heart disease, cardiovascular diseases and all causes. Findings of three Chicago epidemiologic studies. *Circulation* 1982;66:1308-1314.
20. Clay CM, Dyer AR, Liu K, et al. Education, smoking and non-cardiovascular mortality: findings in three Chicago epidemiological studies. *Int J Epidemiol* 1988;17:341-347.
21. Antonovsky A. Social class and the major cardiovascular disease. *J Chron Dis* 1968;21:65-106.
22. Morgenstern H. The changing association between social status and coronary heart disease. *Soc Sci Med* 1980;14A:191-201.