ABSTRACT

BACKGROUND: We previously investigated trends in subclinical coronary artery disease and associated risk factors among autopsied non-elderly adults who died from nonnatural causes. Although grade of atherosclerosis declined from 1981 through 2009, the trend was nonlinear, ending in 1995, concurrent with increasing obesity/diabetes in this population. The previous study used linear regression and examined trends for all 4 major epicardial coronary arteries combined. The present investigation of coronary artery disease trends for the period 1995 through 2012 was prompted by a desire for more detailed examination of more recent coronary artery disease trends in light of reports that the epidemics of obesity and diabetes have slowed and are perhaps ending.

METHODS: This population-based series of cross-sectional investigations identified all Olmsted County, Minnesota residents aged 16-64 years who died 1995 through 2012 (N = 2931). For decedents with nonnatural manner of death, pathology reports were reviewed for grade of atherosclerosis assigned each major epicardial coronary artery. Using logistic regression, we estimated calendar-year trends in grade (unadjusted and age- and sex-adjusted) for each artery, initially as an ordinal measure (range, 0-4); then, based on evidence of nonproportional odds, as a dichotomous variable (any atherosclerosis, yes/no) and as an ordinal measure for persons with atherosclerosis (range, 1-4).

RESULTS: Of 474 nonnatural deaths, 453 (96%) were autopsied; 426 (90%) had coronary stenosis graded. In the ordinal-logistic model for trends in coronary artery disease grade (range, 0-4), the proportional odds assumption did not hold. In subsequent analysis as a dichotomous outcome (grades 0 vs 1-4), each artery exhibited a significant temporal decline in the proportion with any atherosclerosis. Conversely, for subjects with coronary artery disease grade 1-4, age- and sex-adjusted ordinal regression revealed no change over time in 2 arteries and statistically significant temporal increases in severity in 2 arteries.

CONCLUSIONS: Findings suggest that efforts to prevent coronary artery disease onset have been relatively successful. However, statistically significant increases in the grade of atherosclerosis in 2 arteries among persons with coronary artery disease may be indicative of a major public health challenge.

KEYWORDS: Atherosclerosis; Cardiovascular disease; Subclinical coronary artery disease; Time trends

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Conflict of Interest: None.

Authorship: All authors had access to the data and a role in writing the manuscript.

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Heart disease mortality in the United States has fallen steadily since the 1970s (Figure 1).1,3 Declines have been attributed to both decreased incidence of clinically evident heart disease (eg, hospitalized myocardial infarction) and improved survival among persons with heart disease.4-6 Multiple factors have been implicated as contributing to declining incidence, including increased use of pharmaceuticals for hyperlipidemia/hypertension/type 2 diabetes mellitus, reductions in the prevalence of smoking, and other lifestyle improvements, including increased exercise among certain sectors of the population.7,8

Although declining heart disease incidence and mortality are suggestive of a continuing amelioration of this major public health problem, duration of these trends is unclear. Although the overall rate of deaths due to heart disease in the United States continues to decline,8,13 a few investigations from the United States and Europe have observed a leveling off or increase in heart disease deaths among some age (sex) groups.14-16 It has been proposed that observations of an end to declines in mortality might have resulted from substantial increases in 2 major risk factors for coronary artery disease, namely diabetes mellitus and obesity.15,16

In previous studies conducted in Olmsted County, Minnesota, we demonstrated that, consistent with declines in hospitalized myocardial infarction and heart disease mortality,6,9 there was an overall decline in severity of subclinical coronary artery disease from 1981 through 2004; however, the rate of decline was nonlinear, with the decline having ended in the mid-1990s.20 A subsequent investigation identified risk factors and trends in coronary artery disease 1981 through 2009 to estimate contributions of increasing obesity and diabetes mellitus in this population to the slowing of declines in subclinical coronary artery disease.21 Both studies of subclinical trends used autopsy data from non-elderly county residents whose manner of death was “nonnatural” (ie, accident, suicide, homicide, or undetermined). In general, there is minimal autopsy referral bias in this group because the autopsy rate is very high (96%) and the decision to autopsy by the Medical Examiner is largely unrelated to coronary artery disease.

The calendar years considered in our latest previous study (ie, 1981-2009)21 occurred before recent reports that the prevalence of obeseogenic risk factors (eg, sedentary life style and high-fat diets) has declined22,23 and that the marked increases in obesity and diabetes mellitus have slowed and for some subgroups have ended.23-28 To address implications of these reports, the present study updates temporal trends of coronary artery disease for Olmsted County residents aged 16-64 years who died from nonnatural causes and were autopsied, to determine whether rates rose, fell, or remained constant from 1995 through 2012. The investigation of trends in coronary artery disease in the present report is also more detailed than that conducted in our previous article, the focus of which was trends in risk factors.21 In our previous investigation, grade of atherosclerosis was treated as a continuous variable; each individual was assigned a mean value for all 4 major epicardial coronary arteries combined; and analyses used linear regression.

**CLINICAL SIGNIFICANCE**

- Of all Olmsted County, Minnesota autopsied decedents aged 16-64 years who died nonnatural deaths, the percentage with any coronary artery disease (grade >0) declined 1995 through 2012 in all 4 coronary arteries.
- Among persons with grades 1-4, there was either no change (2 arteries) or a significant increase over time (2 arteries).
- Although efforts to prevent coronary artery disease seem relatively successful, results seem less encouraging for those with disease.

**METHODS**

This population-based series of cross-sectional investigations was conducted in Olmsted County, Minnesota (2010 US Census, n = 144,248). Because Rochester, the county seat, is relatively isolated from other metropolitan areas and is home to one of the world’s largest medical centers, Mayo Clinic, essentially all medical care received by local residents is provided either by Mayo Clinic or a second group practice, Olmsted Medical Center (OMC), and their affiliated hospitals. Since 1907, every Mayo Clinic patient has been assigned a unique identifier. Information from every Mayo Clinic contact (ambulatory, hospital, emergency department, and nursing home visits), including pathology reports, copies of death certificates, diagnoses assigned at each visit, and autopsy information, is contained within a single file for each patient. Under auspices of the Rochester Epidemiology Project, and with continued funding from the National Institutes of Health, the diagnostic index and medical records linkage were expanded to the few other providers of medical care to local residents.29

All autopsies performed on residents who die in Olmsted County have been conducted in Mayo’s Department of Laboratory Medicine and Pathology using a uniform comprehensive system of autopsy techniques.30,31 Death certificates of almost all residents cared for by Mayo physicians are completed by the Medical Examiner or a Mayo autopsy pathologist. Infrequently, death certificates are completed by oncologists for hospice patients, and by internists for nursing home patients. Death certificates for patients cared for by physicians affiliated with other institutions (eg, OMC) are completed by physicians from those institutions. The entire medical record is reviewed to assign cause of death; autopsy findings take precedence over clinical information.
Approval for the investigation was obtained from Mayo Clinic and OMC institutional review boards. Rochester Epidemiology Project resources, including Minnesota State electronic death certificates and death tapes, were used to identify all Olmsted County residents who died in the county at age 16-64 years during the 18-year period 1995 through 2012.

Decedent characteristics, including sex, residence, age, and location of death were obtained from death certificates and autopsy reports. Deaths were categorized as natural or nonnatural according to the check box located on all county death certificates, which queries whether manner of death was natural, or accident, homicide, suicide, or undetermined. An indicator on all county death certificates (autopsy, yes/no) was used to identify those nonnatural deaths in which an autopsy was performed.

Outcomes
Determination of coronary artery disease was limited to the subset of all non-elderly adult decedents with nonnatural cause of death for whom there was information on grade of coronary atherosclerosis recorded at autopsy and who had not refused authorization for use of medical records in research. One of us (P.N.N.) reviewed autopsy records of all such deaths, including complete pathology reports, and recorded the grade assigned each of 4 major epicardial coronary arteries: left anterior descending, left circumflex, right coronary artery, and left main artery. Grades ranged from 0 (no reduction in cross-sectional luminal area) through 4, with 1, 2, 3, and 4 defined as >0%-25%, 26%-50%, 51%-75%, and >75%, respectively.

Statistical Analysis
Decedent characteristics were summarized using descriptive statistics for 1995-2012 overall and by 6-year calendar periods. Univariate linear and logistic regression models were fit to test for significant associations between decedent characteristics and year of death.

Logistic regression, both unadjusted and age- and sex-adjusted, was used to test whether year of death was associated with coronary artery disease grade. Regression models were fit for each artery. Initial analyses were conducted using ordinal-logistic regression (ie, a proportional odds model) including all grades 0-4. A score test was then used to assess the proportional odds assumption for this regression model.

Because the result of this test was to reject the null hypothesis of proportional odds, we also considered 2 other types of models: (1) a binary logistic regression comparing grade 0 vs grades 1-4 combined, and (2) ordinal logistic regression for grades 1-4 only (ie, omitting grade 0). All 2-way interactions (between age and sex, age and calendar year, and sex and calendar year) were also considered. All analyses were performed using SAS version 9.3 (SAS Institute, Cary, NC). Two-tailed P values <.05 were considered statistically significant.

RESULTS
Decedent characteristics are summarized in Table 1 for Olmsted County residents aged 16-64 years over the period 1995 through 2012. For all decedents combined, mean (SD) age at death was 50 (12) years; 65% were male. There was a significant increase over time in mean age at death for all groups of decedents. Manner of death was nonnatural for 474 (16%). Consistent with patterns observed elsewhere,decedents whose manner of death was nonnatural were younger and more often male compared with decedents whose manner of death was natural. There was a significant increase, from 15.5% to 18.3%, in the proportion of decedents whose death was nonnatural over the period 1995 through 2012 (Table 1). Among those
whose death was nonnatural, 55.7% were accidental; there was no significant change in the proportion whose death was accidental over time ($P = .34$). More than 95% ($n = 453$) of decedents who experienced nonnatural death were autopsied; 90% ($n = 426$) had coronary anatomy graded. Among decedents who experienced nonnatural death, there was no change over time in either the autopsy rate or, among those autopsied, in the proportion with coronary anatomy graded. Further analyses were limited to 415 autopsied nonnatural deaths, with coronary anatomy graded after excluding decedents who were inmates in a local federal prison ($n = 5$) or who declined research authorization ($n = 6$).

**Table 1** Description of Olmsted County Residents Aged 16-64 Years Who Died 1995-2012

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>All deaths</td>
<td>2931</td>
<td>922</td>
<td>972</td>
<td>1037</td>
<td>N/A</td>
</tr>
<tr>
<td>Age, mean (SD), y</td>
<td>50.0 (11.7)</td>
<td>48.9 (12.2)</td>
<td>50.5 (11.3)</td>
<td>50.6 (11.4)</td>
<td>.001</td>
</tr>
<tr>
<td>Males, n (%)</td>
<td>1891 (64.5)</td>
<td>604 (65.5)</td>
<td>645 (66.4)</td>
<td>642 (61.9)</td>
<td>.07</td>
</tr>
<tr>
<td>Non-white race, n (%)</td>
<td>355 (12.1)</td>
<td>116 (12.6)</td>
<td>114 (11.7)</td>
<td>125 (12.1)</td>
<td>.73</td>
</tr>
</tbody>
</table>

Non-natural deaths*    
| No. (% all deaths)     | 474 (16.2)| 143 (15.5)| 141 (14.5)| 190 (18.3)| .01       |
| Age, mean (SD), y       | 38.4 (13.3)| 35.2 (13.7)| 38.3 (12.4)| 40.7 (13.2)| <.001     |
| Males, n (%)            | 362 (76.4)| 106 (74.1)| 119 (84.4)| 137 (72.1)| .68       |
| Non-white race, n (%)   | 61 (12.9)| 18 (12.6)| 17 (12.1)| 26 (13.7)| .57       |

Autopsied, nonnatural deaths* with coronary anatomy graded    
| No. (% of nonnatural deaths) | 426 (89.9)| 131 (91.6)| 128 (90.8)| 167 (87.9)| .98       |
| Age, mean (SD), y           | 38.4 (13.4)| 36.0 (13.8)| 37.7 (12.6)| 40.7 (13.4)| .001      |
| Males, n (%)              | 325 (76.3)| 96 (73.3)| 108 (84.4)| 121 (72.5)| .86       |
| Non-white race, n (%)      | 57 (13.4)| 16 (12.2)| 15 (11.7)| 26 (15.6)| .37       |

*Nonnatural death defined as one of the following manners of death: accident, homicide, suicide, could not determine, or pending investigation.

**Trends in Grade of Coronary Artery Disease**

Figure 2 provides the distribution of grades for each coronary artery over 3 time periods. Over the full period 1995 through 2012, Figure 2 suggests an increase in the proportion of individuals with no atherosclerosis and in the proportion of individuals with atherosclerosis grades 2-4. Table 2 provides results of logistic regression investigating the association between calendar year of death and coronary artery disease grade within each artery, both unadjusted and age- and sex-adjusted. Initial analyses focused on all grades of coronary artery disease as an ordinal measure between 0 and 4 (top row for each

![Figure 2](https://example.com/figure2.png)
artery). Whereas unadjusted data suggest no significant change in disease grade 1995-2012, age- and sex-adjusted data suggest a statistically significant decrease over time. However, consistent with observations in Figure 2, the score test for proportionality failed, violating the primary assumption for valid ordinal regression.

In light of this finding, additional investigation was undertaken and included (1) binary logistic regression comparing persons with grade 0 with persons with grade 1-4 combined, which effectively divided the sample into 2 groups: those with and without any evidence of coronary artery disease; and (2) ordinal logistic regression models limited to persons with disease grades 1-4. This investigation allowed us to explore trends in (1) the proportion of individuals with any evidence of coronary artery disease; and (2) the grade of disease given that an individual had some evidence of coronary artery disease. The dichotomization of the dataset suggested a more complex interpretation of the data.

For each artery, age- and sex-adjusted binary logistic models (#1) all revealed a statistically significant decline in the percentage of decedents with any evidence of coronary artery disease 1995 through 2012. By contrast, the ordinal logistic models (#2) limited to decedents with any evidence of disease showed either no significant change over time (left anterior descending and right coronary artery) or a statistically significant increase in disease grade over time (left circumflex). Although the left main artery also showed a statistically significant increase over time, results for this artery failed the test for proportional odds. This failure resulted from the trend for an increase in severity for left main artery not extending into grade 4, and was correctable by combining grades 3 and 4. The strikingly differing trends from these models account for why the proportional odds assumption was violated in the initial models. No statistically significant 2-way interactions were detected.

### DISCUSSION
Our findings indicate the existence of 2 disparate phenomena among non-elderly adults who died nonnatural deaths from 1995 through 2012. After adjusting for age and sex, the proportion of individuals with any evidence of coronary artery disease declined. However, among those with any evidence of disease, the extent of atherosclerosis remained unchanged or increased.

Our previous investigation of time trends in coronary artery disease risk factors and grade from 1981 through 2009 confirmed our earlier observation of a nonlinear trend in coronary artery disease, with declines ending in the mid-1990s, and found that trends in obesity and diabetes may have contributed to this slowing of decline (estimated increases in grade of 0.02 and 0.04, respectively). Over the period 1981-2009, obesity increased approximately 1 body mass index (weight in kg/height in m²) unit per decade, and diabetes approximately doubled from first to last decade.

The years under investigation in both our previous studies included those during which marked increases in obesity and diabetes mellitus observed locally were similar to those observed nationally. The present study, motivated in part by recent reports that increases in obesity/diabetes have slowed, examined trends in subclinical coronary artery disease from 1995 through 2012.

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Logistic Regression Investigating the Effect of Calendar Year of Death on Grade of Coronary Artery Disease</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Year of Death</th>
<th></th>
<th>Adjusted for Age/Sex</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Left anterior descending artery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ordinal, all grades 0-4</td>
<td></td>
<td>0.99 (0.96-1.03)</td>
<td>0.95 (0.92-0.99)</td>
<td>0.008</td>
</tr>
<tr>
<td>Binary, grades 1-4 (grade 0 = reference)</td>
<td></td>
<td>0.96 (0.92-1.00)</td>
<td>0.91 (0.87-0.96)</td>
<td>0.001</td>
</tr>
<tr>
<td>Ordinal, grades 1-4 (grade 0 omitted)</td>
<td></td>
<td>1.05 (1.00-1.09)</td>
<td>1.01 (0.96-1.06)</td>
<td>0.70</td>
</tr>
<tr>
<td>Left circumflex artery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ordinal, all grades 0-4</td>
<td></td>
<td>0.99 (0.96-1.03)</td>
<td>0.96 (0.92-0.99)</td>
<td>0.02</td>
</tr>
<tr>
<td>Binary, grades 1-4 (grade 0 = reference)</td>
<td></td>
<td>0.96 (0.92-0.99)</td>
<td>0.91 (0.87-0.95)</td>
<td>0.001</td>
</tr>
<tr>
<td>Ordinal, grades 1-4 (grade 0 omitted)</td>
<td></td>
<td>1.10 (1.04-1.16)</td>
<td>1.06 (1.00-1.13)</td>
<td>0.04</td>
</tr>
<tr>
<td>Right coronary artery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ordinal, all grades 0-4</td>
<td></td>
<td>0.99 (0.95-1.02)</td>
<td>0.95 (0.92-0.98)</td>
<td>0.006</td>
</tr>
<tr>
<td>Binary, grades 1-4 (grade 0 = reference)</td>
<td></td>
<td>0.95 (0.91-0.99)</td>
<td>0.90 (0.86-0.95)</td>
<td>0.001</td>
</tr>
<tr>
<td>Ordinal, grades 1-4 (grade 0 omitted)</td>
<td></td>
<td>1.07 (1.02-1.12)</td>
<td>1.03 (0.98-1.09)</td>
<td>0.22</td>
</tr>
<tr>
<td>Left main artery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ordinal, all grades 0-4</td>
<td></td>
<td>0.97 (0.94-1.01)</td>
<td>0.95 (0.91-0.98)</td>
<td>0.006</td>
</tr>
<tr>
<td>Binary, grades 1-4 (grade 0 = reference)</td>
<td></td>
<td>0.94 (0.91-0.98)</td>
<td>0.91 (0.87-0.95)</td>
<td>0.001</td>
</tr>
<tr>
<td>Ordinal, grades 1-4 (grade 0 omitted)</td>
<td></td>
<td>1.14 (1.06-1.22)</td>
<td>1.10 (1.03-1.18)</td>
<td>0.008</td>
</tr>
</tbody>
</table>

CI = confidence interval.
Of few publications that similarly used autopsy findings from nonnatural deaths to investigate temporal trends in coronary artery disease, only 1 study, that by Webber et al, included deaths after 1995, the year for which our present and previous studies observed that the pattern of consistent declines in disease severity had changed. Webber et al focused on the prevalence of autopsy-determined atherosclerosis among US service members who died in foreign military operations within the period 2001 through 2011 and found a steep decline between rates from that period and the rates recorded in the Korean and Vietnam wars. However, these findings are not directly comparable to ours because Webber et al compared the overall rate from 2001-2011 with published rates from 2 much earlier time periods, rather than our comparison of annual rates 1995 through 2012. Moreover, the authors note at least 3 methodologic discrepancies between the periods being compared, as well as selection bias associated with the shift from a conscription-based to volunteer army.

To our knowledge, only 1 investigation (by Bild et al) has examined temporal trends in subclinical heart disease using non-autopsy methods. Subjects in that study consisted of older individuals who agreed to participate in the Multi-Ethnic Study of Atherosclerosis, a multi-site longitudinal-cohort study that obtained serial computed tomography scans for coronary artery calcification and standardized prospective measures of coronary artery disease risk factors. Bild et al followed individuals from baseline examinations (beginning in 2000) for up to 5 examinations, ending in 2012. Trends in coronary artery disease risk factors were generally consistent with those observed for Olmsted County, with lower blood pressure but increased use of antihypertensive medication, and lower rates of current smoking, but higher levels of diabetes mellitus and use of antihyperlipidemia medication. Although temporal increases in coronary artery calcification were observed for African Americans, no significant changes were observed for the 3 other ethnic groups, including whites. Comparison with our study findings is problematic owing to marked differences in age (16-64 years vs 55-84 years in Bild et al), measure of atherosclerosis (coronary artery disease grade vs coronary artery calcification), and study design (independent cross-sectional samples vs a longitudinal cohort with substantial loss to follow-up).

Consistent with our earlier investigations of grade of atherosclerosis among decedents with nonnatural manner of death, the age group of interest in the present study was 16-64 years. We believe inclusion of younger individuals is a strength because of accumulating evidence of subclinical heart disease in this age group and because the lifetime consequences of temporal trends in subclinical atherosclerosis are likely to have substantial implications for these younger individuals. Although we found no significant interactions between age and calendar year, we further investigated whether our findings differed as a function of age by limiting analyses to decedents aged 25-64 years (n = 325) and to decedents aged 35-64 years (n = 246).

Comparison of findings for both ages 25-64 years and ages 35-64 years revealed the same directions in temporal trends and essentially the same point estimates as shown in Table 2 for the age group 16-64 years (n = 415). For each artery, age- and sex-adjusted binary logistic models all revealed a statistically significant decline in the percentage of decedents with any evidence of coronary artery disease 1995 through 2012. The ordinal logistic models limited to decedents with any evidence of disease showed either no significant change over time or statistically significant increases in disease grade over time (data not shown, available on request).

Our study has several limitations. The investigation was conducted for a single geographic population, which in 2010 was 86% white. Olmsted County age, sex, and racial distributions, together with rates of medical utilization and disease prevalence, are very similar to those for Minnesota and all other upper Midwest states. However, Olmsted County median income and education are higher. Although no single geographic area is representative of all others, the underrepresentation of minorities and the fact that essentially all medical care is delivered by few providers may limit the generalizability of our study findings to different racial and socioeconomic groups and more heterogeneous health care environments.

Although during the calendar years under study, protocols and reporting forms for both the autopsy and the microscopic examination were virtually unchanged (W.D.E.), there were changes among personnel conducting the autopsy and microscopic examinations. However, a previous Olmsted County study compared coronary artery disease grades reported at autopsy with repeated review of specimens; the agreement indices for “no high-grade disease” ranged from 0.79 to 0.88.

The present study was limited to decedents with nonnatural death. In our previous publication that considered the time period 1981-2009, we obtained data on coronary artery disease risk factors for both non-elderly adult autopsied decedents with nonnatural manner of death (n = 545) and a random sample of non-elderly adult Olmsted County residents (n = 1244). Data were abstracted using the same protocol for both groups. Findings from that study reveal that the prevalence of coronary artery disease risk factors was generally higher for non-elderly adult decedents whose manner of death was nonnatural compared with all non-elderly Olmsted County residents. However, risk factor trends for both groups were in the same direction and generally of the same magnitude. Both groups showed no significant change 1981 through 2009 for age or gender, significant increases for the proportion of non-white individuals, obese (body mass index ≥30 kg/m²) individuals, and those with diagnosis and/or treatment of hyperlipidemia. Both groups exhibited significant decreases in diastolic blood pressure values and the proportion currently smoking. Systolic blood pressure values and the proportion currently using alcohol decreased over time in both groups, but the decreases reached significance only for the
The proportion using antihypertension medication and the proportion with diabetes (based on glucose values and/or antidiabetic medication use) increased in both groups, but increases only reached significance for the larger population sample. Although the capacity to conduct the labor-intensive task of abstracting risk factor data from the extensive provider-linked medical records for both decedents and the general population was beyond the time limits and financial constraints of the present study, we did explore trends in the percentage of non-whites for both groups. The temporal increase 1995-2012 in percentage of non-whites among autopsied decedents with coronary anatomy graded (Table 1) was not dissimilar to the increase in percentage of non-whites among all Olmsted County residents aged 15-65 years (2000 and 2010 Census data 9.3% and 13.4%).

CONCLUSIONS
Our most notable finding is the existence of divergent trends across the spectrum of coronary artery disease, with potentially different implications for morbidity, mortality, public policy, and delivery of medical services. The first conclusion is that major public efforts for prevention of coronary artery disease onset, including changes in lifestyle and pharmaceutical interventions, seem to be successful: the proportion of non-elderly decedents with any evidence of atherosclerosis at autopsy declined from 1995 through 2012. The second conclusion, however, is that among persons already affected by coronary artery disease, its severity may be remaining constant or even increasing over time, possibly owing to differential trends in risk, including smoking, hyperlipidemia, hypertension, obesity, and diabetes mellitus.21

Two important messages emerge from this research. The first is the value of prevention, because it is often easier and less costly to prevent many illnesses than to treat them.47-49 The second is a continuing need to address the existence and extent of risk factors contributing to the progression of coronary artery disease after onset.

The potential significance of our findings is illustrated by the increasing burden on the public health system, which is likely to result from the projected increase in the prevalence of coronary artery disease from 8.3% in 2015 to 9.3% in 2030 in the US.50 If, as our findings suggest, the severity of atherosclerosis in persons with subclinical disease may be increasing, the projected rise in coronary artery disease prevalence may underestimate the potential burden for affected individuals and the public health system as a whole.

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