There are few public health success stories greater than the dramatic declines in cardiovascular disease (CVD) mortality rates achieved from about 1970 to 2010 in almost all Western countries. In many countries, age-adjusted death rates fell 70% or more during this period. Driven by the critical observations of epidemiologic studies and by novel insights into cardiovascular disease pathogenesis, there were major leaps forward in our ability to prevent CVD events and prevent fatality among those with acute CVD events such as myocardial infarction, stroke, and acute decompensated heart failure.

The recognition of causal risk factors, including tobacco use, atherogenic cholesterol profiles, elevated blood pressure, and dysglycemia and their upstream enablers of unhealthy dietary patterns and sedentary lifestyle, led to widespread public health initiatives, societal/environmental changes, and individual behavioral changes. In turn, these facilitated substantial reductions in smoking prevalence, lower cholesterol levels, and somewhat lower blood pressure levels in the US population (primordial and primary prevention). At the same time, the introduction of evidence-based preventive medications targeting blood pressure and low-density lipoprotein cholesterol reduction to treat individuals at risk for CVD (primary prevention) has increasingly reduced incident CVD events. Just as important in reducing CVD mortality rates was the sequential introduction of evidence-based therapies for individuals with acute CVD events and improved care after these events (secondary and tertiary prevention). Training of hospital staff in resuscitation and defibrillation; use of aspirin, β-blockers, antithrombotics, angiotensin-converting enzyme inhibitors, and statins; use of thrombolytics and primary revascularization strategies for acute myocardial infarction and stroke; and improved surgical and catheter-based revascularization techniques and heart failure care all appear to have contributed to reductions in CVD mortality over the decades. Thus, both public health and health care progress contributed roughly equally to these declines. Indeed, the inflection point in CVD mortality rates in the United States, when increases observed for the entire


**Invited Commentary**

**Slowing Progress in Cardiovascular Mortality Rates**

**You Reap What You Sow**

Donald M. Lloyd-Jones, MD, ScM

**There are few** public health success stories greater than the dramatic declines in cardiovascular disease (CVD) mortality rates achieved from about 1970 to 2010 in almost all Western countries. In many countries, age-adjusted death rates fell 70% or more during this period. Driven by the critical observations of epidemiologic studies and by novel insights into cardiovascular disease pathogenesis, there were major leaps forward in our ability to prevent CVD events and prevent fatality among those with acute CVD events such as myocardial infarction, stroke, and acute decompensated heart failure.

The recognition of causal risk factors, including tobacco use, atherogenic cholesterol profiles, elevated blood pressure, and dysglycemia and their upstream enablers of unhealthy dietary patterns and sedentary lifestyle, led to widespread public health initiatives, societal/environmental changes, and individual behavioral changes. In turn, these facilitated substantial reductions in smoking prevalence, lower cholesterol levels, and somewhat lower blood pressure levels in the US population (primordial and primary prevention). At the same time, the introduction of evidence-based preventive medications targeting blood pressure and low-density lipoprotein cholesterol reduction to treat individuals at risk for CVD (primary prevention) has increasingly reduced incident CVD events. Just as important in reducing CVD mortality rates was the sequential introduction of evidence-based therapies for individuals with acute CVD events and improved care after these events (secondary and tertiary prevention). Training of hospital staff in resuscitation and defibrillation; use of aspirin, β-blockers, antithrombotics, angiotensin-converting enzyme inhibitors, and statins; use of thrombolytics and primary revascularization strategies for acute myocardial infarction and stroke; and improved surgical and catheter-based revascularization techniques and heart failure care all appear to have contributed to reductions in CVD mortality over the decades. Thus, both public health and health care progress contributed roughly equally to these declines. Indeed, the inflection point in CVD mortality rates in the United States, when increases observed for the entire
20th century suddenly flipped to sustained declines, occurred in 1968, shortly after the US Surgeon General’s first report on tobacco and coincident with the introduction of coronary care units for patients with acute myocardial infarction.

However, while we celebrated these successes and appeared to be poised for victory, the seeds of our undoing were being planted. The largest populationwide epidemic of chronic disease in human history began to be evident in 1985. Since that time, we have seen relentless increases in the prevalence of obesity and trailing, but alarming, increases in the prevalence of diabetes affecting all ages and segments of the population. And right on schedule, about 25 years into the obesity epidemic, there appears to have been a sudden slowing in the progress of declining CVD mortality rates, with now almost stagnant changes in age-adjusted CVD mortality and actual increases in crude mortality rates and total CVD deaths over the last few years as a result of population growth.

In this issue of JAMA Cardiology, Sidney et al2 catalog US CVD mortality rates from 2000 to 2014 using the online resource of the Centers for Disease Control and Prevention’s Wide-ranging Online Data for Epidemiologic Research data set. They observed a deflection point in age-adjusted mortality rates in 2011, with essentially flat rates from 2011-2014 that were statistically and substantially different from rates in 2000-2010. Findings were consistent across all CVD, heart disease, and stroke mortality outcomes in men and women and across all racial/ethnic groups (with the possible exception of American Indian/Alaska Native individuals, but numbers in this subgroup were small).2 These results follow on the first signals of flattening heart disease death rates, noted a decade ago among younger US individuals,3 the canaries in the coal mine.

It was anticipated that, in approximately 2013, and for the first time in more than a century, heart disease would no longer be the single leading cause of death in the United States. Many in the cardiovascular community were poised to celebrate the “We’re number 2” moment. Looking further out, it was even possible that all CVD might fall below all cancers as the leading causes of death. It is notable that cancer death rates have been falling consistently since 2000 as well. This progress has likely been owing to many of the same public health improvements and the “common soil” of risk factors for cancer and CVD, as well as improvements in cancer treatment. However, there has been no observable deflection in cancer mortality rates. Heart disease death rates came tantalizingly close to falling to second, and now the gap may be widening.

When we were developing the American Heart Association’s Strategic Impact Goals for 2010-2020,4 including a goal for further reduction in CVD mortality, the committee recognized that sustaining the more than 30% reduction from 2000-2010 would be difficult. Therefore, we targeted a 20% reduction by 2020. This appeared to be an eminently achievable goal, although we were aware that declines might slow because of the obesity epidemic. In truth, the goal of improving the cardiovascular health of all Americans by 20% by 2020 appeared to be the more difficult target to achieve. With these recent data, however, even the seemingly easier goal of reducing CVD deaths by 20% may elude us.

As a societal imperative, we must redouble our prevention efforts on all fronts. Until we are serious about primordial prevention, beginning in utero and lasting through early childhood well into middle age, we will continue to require more medical interventions, and incur more costs,5 to curb CVD. Recent data suggest that individuals who can avoid the development of CVD risk factors into middle age have substantially lower risks for not just CVD, but also cancer, cognitive dysfunction, and other chronic diseases. Such individuals also live significantly longer and stay healthier longer, compressing morbidity closer to the end of their prolonged lives and even possibly costing less during their Medicare lifespans.5 Maintaining ideal levels of cardiovascular health into middle age will be a transformative strategy for the population. But until that day, we will need more people to be treated for their risk factors and for acute, and possibly fatal, CVD events. For now, it appears we will be reaping what we have sown in the obesity epidemic over the last several decades. This bitter harvest can still be largely avoided if patients, physicians, public health officials, and politicians can finally create meaningful policies and pathways to enable a culture that prioritizes health and promotes prevention. The time is now, if not already past for some.

REFERENCES


