In the last 100 years, we have changed the way we live—what we eat and drink, whether and how much we exercise, how we drive, what we inhale. Our shifting lifestyles contribute not only to heart disease but also to cancer, obesity, diabetes, and other conditions that collectively explain about half of all premature deaths in America. Worldwide, noncommunicable diseases are the top killer and on the rise.

HSPH researchers have worked to understand the complex factors that steer behavior in unhealthy directions, and what can be done—educationally, medically, even politically—to shift course.
TAKING THE LONG VIEW

Don’t smoke. Drink only in moderation. Maintain a healthy weight. Exercise regularly. Eat a diet rich in fruits and vegetables. Don’t overindulge in red meat or butter.

We take most of these prescriptions for a “healthy lifestyle” for granted today. But they were not always so obvious.

Much of what we now know about healthy living is owed to work begun in the first half of the 20th century by HSPH faculty and others using a method known as the longitudinal cohort study. This study teases apart both obvious and hidden risk factors for disease by following a specific group of people over an extended period of time.

The concept of disease “risk factors” itself had its genesis in a famous cohort study called the Framingham Heart Study, which began in 1948 under the auspices of the National Heart Institute (now the National Heart, Lung and Blood Institute) and is currently in its third generation. An earlier example is the 1922–1935 Harvard Growth Study, which yielded some of the first benchmarks for growth and development in healthy children.

ASK A NURSE

What would become one of the largest and most important cohort studies examining the role of environment and behavior on disease began modestly in 1976, when a small group of researchers from HSPH, Harvard Medical School, and Brigham and Women’s Hospital, led by HSPH’s Frank Speizer, designed and launched a questionnaire for a small group of female nurses ages 30 to 55. The Nurses’ Health Study’s goal was to clarify the connection between smoking history, use of oral contraceptives, and subsequent disease.

The study soon expanded to include 120,000 female nurses. The questions broadened to include participants’ medical history, health status, and individual habits such as whether they took vitamins or replacement hormones, whether they attended religious services, and how many friends they had. In 1989, Walter Willett, now chair of the HSPH Department of Nutrition, launched a companion study known as Nurses’ Health Study II, which enlisted another 116,000 participants to delve even more deeply into questions of diet and nutrition.

The Nurses’ Health Studies and the follow-up Physicians’ Health Study, which recruited 22,000 men, have provided a treasure trove of epidemiological information, much of it running counter to conventional medical wisdom. (See sidebar, right.)

BOSTON BROTHERS STUDY

Immigration made possible one of the early studies in the 1960s analyzing the role of genes versus environment on chronic disease. The Boston Brothers Study—co-led by HSPH and Trinity College in Ireland—compared the health of 500 brothers who lived on either side of the Atlantic Ocean. With genetics relatively constant, researchers discovered that the U.S.-based brothers suffered higher rates of atherosclerosis, higher proportions of body fat, and higher numbers of abnormal electrocardiograms. While their diets were similar to those of their Irish kin, the U.S. brothers led much more sedentary lifestyles. This evidence helped establish the protective effect of exercise on heart disease.
Emily O’Connell has had a longer relationship with the Nurses’ Health Study (NHS) than with her own husband.

The Quincy, Massachusetts–based school nurse has been married for 23 years. She’s been filling out the NHS questionnaire for more than 30, though she doesn’t remember exactly when she started. All she remembers is getting an invitation in the mail while she was a nursing student and figuring it would fulfill a degree requirement to take part in scientific research.

“I had just completed my master’s degree and had suffered the experience of having to recruit participants for studies,” she recalled. “So I joined just to help out the researchers. I had no idea how influential it would be in the future. My close friends, who understand the importance of what I’m doing, really ooh and goo and are proud of me. They’re a little jealous that I’m part of this famous study.”

For the last three decades, filling out that annual form on women’s health—first with paper and pencil, then on computer, while also offering up the occasional blood sample and saliva cheek swab—has become one of her proudest achievements. O’Connell, 62, displays an NHS plaque on the wall of her den, and every year when the questionnaire arrives, she finds herself nattering away about it to her friends, family, and anyone who will listen. “It probably takes me a week before and a week after to stop talking about it,” she said.

O’Connell’s own health has remained stable; she doesn’t smoke, she doesn’t drink heavily, and she never eats junk food. Still, answering the survey questions has made her more aware of her personal choices. “I didn’t think about whether or not I ate a green vegetable every day or whether I ate an orange vegetable five times a week,” she said. “I just do.”

But logging in her daily activity diary made her realize how little she exercised. “I was learning that I was a pretty sedentary person to start with,” she said. So for years, she’s been taking long daily walks along a beach near her house. O’Connell also decided against taking estrogen after menopause (as her mother had), after the NHS data suggested it may increase the risk of breast cancer. In fact, O’Connell’s doctor “was opposed to using hormone replacement therapy without extreme reason—because of the Nurses’ Health Study.”

O’Connell plans to stay in the NHS for the rest of her life. She’s even told her husband to notify the investigators when she dies. That way, researchers can add the circumstances of her death to their data. Granted, it’s possible her husband will forget, she said, but enough people know how much she’s valued her role in women’s health research that “they will harass him if he doesn’t do it.”

### Nurses’ Health Study and Physicians’ Health Study Key Findings

**Nurses’ Health Study:**

- Smoking dramatically raises the risk of coronary artery disease and stroke—but the risk is reduced within a few years after quitting smoking.
- Current use of oral contraceptives raises the risk of breast cancer and coronary heart disease, and current use of postmenopausal hormones increases the risk of stroke.
- Obesity strongly increases the risk of coronary heart disease, but protects against hip fractures.
- One or two alcoholic drinks per day reduce the risk of coronary heart disease, but raise the risk of breast cancer.
- A Mediterranean-type diet reduces the risk of coronary heart disease and stroke, while refined carbohydrates and trans fats increase the risk of heart disease.

**Physicians’ Health Study:**

- Daily low-dose aspirin decreases the risk of heart attack.
- Vitamin C and E supplements do not prevent major cardiovascular events, cancer, or eye disease.
FOOD FOR THOUGHT

We owe the distinction between “good” cholesterol and “bad” fats, and the concept of the basic four food groups, to Fredrick Stare, Mark Hegsted, and their colleagues who worked in HSPH’s Department of Nutrition in the mid-20th century.

Stare, who founded the department in 1942, was an accomplished scientist known for breakthroughs uncovering the links between diet and heart disease in lab work with New World monkeys. But he also appreciated the importance of communicating nutrition information to the public in simple, easy-to-understand ways.

He summed up his philosophy with the phrase “the simpler you can keep it, the better,” and he famously advocated a “sensible” approach to nutrition that included enjoying food and avoiding fads. He coined the term “Basic Four Food Groups,” compressing the government’s then-current “Basic 7” and underscoring the importance of a diet that balances fruits and vegetables, grains and cereals, dairy products, and high-protein foods such as meat, poultry, and eggs. The U.S. Department of Agriculture (USDA) has since updated its nutrition guidelines several times (see chart on page 37), and HSPH, in keeping with Stare’s legacy, has kept pace by offering alternative versions such as the Healthy Eating Pyramid, published in 2005, and the Healthy Eating Plate, released in 2011.

Stare’s early work paved the way for hundreds of studies and scholarly reviews on diet and nutrition since, including a seminal report in 1966 by Hegsted and others that described a definitive link between dietary fat and serum cholesterol levels. Hegsted earned high praise for his mathematical equation demonstrating that saturated fats and dietary cholesterol from meats and eggs raised the levels of harmful cholesterol, while polyunsaturated fats in foods like fish lowered the total cholesterol level. He found that monounsaturated fats, such as in nuts and certain plant oils, likely did neither.

YES TO MEDITERRANEAN DIET

Our knowledge of diet’s role in health has expanded even further in the past 20 years. The virtues of meals rich in olive oil, legumes, whole grains, fruits, and vegetables—collectively known as the Mediterranean diet—have inspired healthier eating far beyond the borders of countries such as Greece, Italy, and Spain where such menus have long been popular.
“Even the best available drugs, like statins, reduce heart disease by about 25 percent. This is in the same ballpark as the Mediterranean diet,” said HSPH Department of Nutrition Chair Walter Willett. “But the statins increase the risk of diabetes, whereas this diet can help reduce the risk.”

Willett has taken over Stare’s role (and appropriately holds the Fredrick John Stare Professorship of Epidemiology and Nutrition) as one of the country’s leaders in nutrition research. He has long touted the benefits of a Mediterranean diet.

NO TO TRANS FATS AND SUGARY BEVERAGES
As a nutrition activist, Willett also has focused on changing the food environment to make healthy fare more accessible, and unhealthy options less so. One of his major achievements has been to reduce the use of trans fats—produced by the partial hydrogenation of unsaturated fatty acid vegetable oils—which are in hardened vegetable oils, most margarines, commercial baked foods, and many fried foods. Willett helped show that an excess of trans fats raises the risk of high blood lipid levels, type 2 diabetes, and other illnesses.

Policymakers have listened. In 2006, the U.S. Food and Drug Administration began to require nutrition labels to list all harmful trans fatty acids. Over the last 15 years, largely in response to Willett’s alarms, trans fats levels in the American diet have plummeted by 80 percent.

Willett and colleagues at HSPH and nationally have also called on beverage makers to reduce the sugar and salt content of their drinks. “There is abundant evidence,” he said, “that the huge increase in soda consumption in the past 40 years is the most important single factor behind America’s obesity epidemic.”

Still, more battles lie ahead. “The major players in the food system do not want any change, because soda, refined starches, and sugar provide huge profit margins. There are big economic and political obstacles in making change,” said Willett. But the public health stakes are high. “Heart disease, various cancers, eye diseases, birth defects—the list expands,” he said. “There’s almost nothing on which diet does not have an effect.”

BERTHA BURKE’S DIET FOR A HEALTHY BABY
In the 1940s, HSPH’s Bertha Burke published a series of influential papers linking the quality of a mother’s diet to the health of her baby. She drew from the landmark Longitudinal Studies of Child Health and Development at the School that tracked 300 individuals from prenatal stages into adulthood—the first comprehensive study of normal childhood growth and development. Burke’s Daily Diet During Pregnancy pamphlet, first published in 1941, contains advice that largely holds up today, such as sticking to lean meats and limiting salt. But it also recommends a daily egg, potato, and three teaspoons of butter. Burke translated her findings for popular audiences, writing articles in women’s magazines and widely distributed pamphlets. She retired as professor emerita of maternal and child nutrition in 1961.
GLOBESITY
Despite the robust research on diet and health, the waistlines of Americans and people around the world continue to grow at alarming rates—exactaing a high price on individuals and on health care systems. The Centers for Disease Control and Prevention reports that more than one in three American adults are obese—a dramatic about-face from a century ago, when malnourishment was common.

Worldwide, obesity has nearly doubled globally since 1980, according to the World Health Organization, with two-thirds of the world’s population living in countries where overweight and obesity kill more people than underweight. Obesity-related conditions range from stroke and type 2 diabetes to heart disease and some cancers.

To thwart the trend, HSPH has developed an interdisciplinary approach to researching the causes and consequences of obesity, and to developing strategies for prevention. HSPH Professor Frank Hu is among those leading the effort, and his work on the topic takes an in-depth look at obesity’s risk factors, including diet, physical activity, sedentary behavior, and genes, as well as the newly emerging risk factors of sleep deprivation and the in utero environment. Hu has also collaborated with researchers from China to study the particular threat that obesity, metabolic syndrome, and cardiovascular disease pose to Chinese populations.

THE SECRETS OF METABOLIC DISEASE
While Hu and colleagues are trying to curb the rates of obesity, others are studying how to treat obesity-related diseases. One of the stars of this field is HSPH Professor Gökhan Hotamisligil, who chairs the Department of Genetics and Complex Diseases.

“The big question for me,” Hotamisligil said, “was why, in the presence of even a few extra pounds of accumulated fat, do you become prone to so many different diseases, including insulin resistance, diabetes, hypertension, asthma, neurodegenerative diseases, and cancer?”

Since arriving at the school in 1995, Hotamisligil has hunted the complex and elusive biological links between obesity and insulin resistance—the first stage in developing metabolic illness. He has bred special genetically altered mice that can gain weight and become obese and yet never develop or suffer the ill effects of obesity-related disease. He has uncovered new molecular pathways and identified control points that may prove to be valuable targets for short-circuiting the connection between obesity and poor health. He also studies the mechanisms behind inflammation—the body’s complex biological response to the cellular stress and injury caused by obesity, which is different from the classic inflammation caused by infection. Hotamisligil’s work could lead to novel treatments for metabolic illness.

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A Visual History of Food Guides

**1943** > The USDA introduces the “Basic 7” food guide, aimed at maintaining nutrition standards during the wartime period of food rationing.

< **1955**  HSPH researchers condense the Basic 7 food groups into a Basic Four, which the USDA subsequently adopts.

**1977**  HSPH professor Mark Hegsted helps map out the Dietary Goals for the United States, providing the basis for the 1979 Hassle-Free Daily Food Guide.

**1992** > The Food Guide Pyramid is the USDA’s first set of guidelines to include recommended servings for each of the food groups.

< **2005**  The USDA unveils MyPyramid, with vertical wedges representing the food groups, and a figure scaling a set of stairs along its side to represent the importance of physical activity.

**2005** > HSPH responds to the confusing new USDA pyramid with the Healthy Eating Pyramid, grounded in the best available scientific evidence about the links between diet and health.

< **2011**  The USDA’s MyPlate is released, replacing two decades of pyramids with a simpler approach representing an actual meal.

**2011** > HSPH’s Healthy Eating Plate corrects key flaws in MyPlate by focusing on whole grains, healthy proteins and oils, and vegetables other than potatoes. The red running figure is a reminder to stay active.
THE DESIGNATED DRIVER

In the mid–1980s, the practice of choosing a “designated driver” to prevent alcohol-related traffic fatalities was not yet part of American culture. By the end of the decade, “designated driver” had become a household expression in the United States, thanks to Jay Winsten, associate dean for health communication and the Frank Stanton Director of the School’s Center for Health Communication.

Winsten’s center spearheaded a national campaign that created an enduring social ritual in the public consciousness. As Winsten explained, the slogan “The designated driver is the life of the party” was a “positive message that lent social legitimacy to the option of refraining from alcohol.” The campaign imported its underlying concept from Scandinavia.

The designated driver program also demonstrated how a fresh idea could be rapidly disseminated through American society via mass communication. TV writers agreed to insert drunken-driving-prevention messages, including frequent references to designated drivers, into story lines of top-rated television programs, such as Cheers, L.A. Law, and The Cosby Show. A report from the Kaiser Family Foundation stated that Winsten’s campaign “is widely considered to be the first successful effort to partner with the Hollywood community to promote health messages in prime-time programming.”

When the campaign launched in 1988, alcohol-related traffic deaths stood at 23,626 annually. By 1994, fatalities had dropped by 30 percent. That change was likely due to raising the legal drinking age, reducing the legal blood-alcohol level, stronger law enforcement, safer vehicles—and the designated driver campaign.

But Winsten’s work isn’t done. The next battleground: a campaign against “distracted driving,” including texting and cell phone use.

BINGE DRINKING

Stroll through a college campus on a typical Saturday night, and youthful intoxication seems rampant. About two in five college drinkers say they drink to get drunk. And in this age group, it doesn’t take much to become inebriated. Those who imbibe four or five drinks in a row—a level known as “binge drinking”—suffer clear alcohol-related harm, according to Henry Wechsler, then-lecturer in the Department of Society, Human Development, and Health (now called the Department of Social and Behavioral Sciences), who served as principal investigator in the School’s College Alcohol Study (CAS). Beginning in 1993, Wechsler and collaborators surveyed more than 50,000 college students and found that half of them are binge drinkers. The damaging consequences include reduced academic performance, trouble with police, unplanned sex, and serious injury.

In the July 2008 issue of the Journal of Studies on Alcohol and Drugs, Wechsler and then-CAS co-director Toben Nelson wrote that “there is no one size fits all” solution to underage drinking on campus. But they found that schools and communities with the fewest problems often had state minimum-drinking-age laws, stronger enforcement of these laws, fewer alcohol outlets, and limits on irresponsible marketing practices, such as all-you-can-drink specials and “ladies nights,” when women drink for free.

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DRIVING HOME THE MESSAGE

Retired police officer Carl McDonald stopped many a weaving driver during his years on the force in Texas. He said the argument against drinking and driving was a lot harder to make before Jay Winsten, HSPH’s Frank Stanton Director of the School’s Center for Health Communication, rolled out the designated driver campaign in 1988.

“I would arrest people and they would complain, ‘Well, how am I supposed to get home? I live way out here and I went to the bar, blah, blah, blah. There’s no taxicabs, there’s no public transport,’” recalled McDonald, who now runs law enforcement initiatives for Mothers Against Drunk Driving (MADD). “The designated driver was the answer to that.”

According to Winsten, MADD had helped prepare the ground for the designated driver campaign with years of highly visible work against drunken driving. But by the mid-to-late 1980s, those gains had begun to slip.

The designated driver campaign (see page 38) quickly became a rallying point for communities, said McDonald. Tavern and bar owners would offer free sodas to anyone declaring himself or herself a designated driver. In one creative initiative, the Kansas State Police walked through bars in uniform and personally placed coasters with the “designated driver” message under the glasses of patrons.

“MADD adopted the designated driver message back then, and it’s now part of everything we say,” said MADD President Jan Withers, whose 15-year-old daughter died in a drunken-driving accident in 1992. Withers added that the campaign helped the organization move away from a “scolding” tone toward more positive and constructive rhetoric.

The designated driver campaign continues, as illustrated in a new partnership between the National Football League, MADD, and several alcoholic beverage companies. MADD representatives walk around football stadiums, engage groups of friends in conversation, and help them designate a nondrinking driver. That person will then get a wristband that not only stops the patron from ordering drinks at the concession stand but also enters him or her into a raffle for prizes.

Still, the message is not getting through to everyone. McDonald cited a 2013 Florida study, conducted in a college town the night before a big football game, which found that although 65 percent of designated drivers had no alcohol in their systems, 35 percent had something to drink. “We say, ‘Take that extra step and make sure you have a designated nondrinking driver,’” said Withers.

“We haven’t totally won the cultural war yet on drunken driving, but I think the evidence lies in the numbers,” McDonald said. Drunken driving deaths hover around 10,000 today, down from 26,000 in the early 1980s.
SMOKE SIGNALS

It was the 1970s in Greece—a nation which, then and still now, boasts one of the highest smoking rates in the world. Not only was lighting up socially accepted, but tobacco was a major crop in some regions of the country.

Dimitrios Trichopoulos, then a young cancer epidemiologist at the University of Athens, was trying to persuade his wife to quit the habit. When he said she was hurting herself—by then, the science was incontrovertible—she didn’t care. When he said she was hurting him, she didn’t believe him.

So he set out to prove her wrong. In 1981, Trichopoulos, who is now the Vincent L. Gregory Professor of Cancer Prevention at HSPH, teamed with Brian MacMahon, then-chair of the Department of Epidemiology, to become one of the first scientists to show, through a case-control study, the risks of second-hand smoke. By looking at 51 nonsmoking women hospitalized with lung cancer in Greece, and comparing them with age-matched women hospitalized for other problems, MacMahon and Trichopoulos determined that the cancer-ridden patients were significantly more likely to have been exposed to their husband’s cigarettes. Follow-up studies went on to confirm the risks of smoke inhalation by children in smoking households or in nonsmokers who live nearby.

“With these findings, smoking was no longer perceived as merely a bad habit that endangered an individual’s own health status,” wrote Robin Marantz Henig in The People’s Health. “It became instead a public health menace that endangered everyone.”

TOBACCO BATTLES

Since then, the tobacco industry has encountered other formidable foes inside HSPH—including Greg Connolly, who directs the School’s Center for Global Tobacco Control and has served as director of the Massachusetts Tobacco Control Program (where he was credited for cutting the state’s smoking rates in half). Connolly, once a smoker himself, has worked all over the world advising nations—from Ireland and Israel to El Salvador and the Philippines—on how to curb public smoking, secondhand smoke, and smokeless tobacco. In 2000, he was made a Commander of the Fourth Order by the King of Thailand for his efforts with the U.S. Congress, the World Health Organization (WHO), and the WHO-backed General Agreements on Tariffs and Trade (GATT) to halt U.S. trade sanctions imposed against Thailand for its refusal to import and advertise cigarettes.

Connolly once explained the secrets of a successful anti-smoking campaign: “You have to build the capacity to do research locally, then add a heavy dose of aggressive anti-tobacco advertising to foster social change and build enough political will to raise taxes, ban smoking in public places, and offer people treatment for tobacco addiction.”
Julius B. Richmond (1916–2008) waged a multifront battle for public health. Trained in pediatrics and child development, he was appointed in 1965 as the first director of the national Head Start program, the federally backed comprehensive program for low-income children. From 1977 to 1981, he served as U.S. Surgeon General, reinvigorating tobacco control efforts through the release of the 1979 Surgeon General’s report *Smoking and Health*, which presented scientific evidence of the many harms of smoking. From 1981 to 1988, Richmond was professor of health policy at HSPH. Today, the School’s highest honor, the Julius B. Richmond Award, recognizes individuals who, like Richmond, have promoted and achieved high standards for public health conditions in vulnerable populations.
Persuading people to change their daily habits is a daunting challenge, even when they know that short-term gain sometimes leads to long-term pain. “We’re not coldly calculating machines. We are motivated by the part of the human brain that is heavily present-focused,” said Ichiro Kawachi, chair of the Department of Social and Behavioral Sciences.

Altering behavior—for example, getting kids to eat fewer sugary calories, increase fruit and vegetable consumption, or watch less TV—requires active learning, social support, and often subtle cues in the environment. As director of the HSPH Prevention Research Center (HPRC), Steven Gortmaker and colleagues have been teaming up with local community partners since 1998 to design and help implement both in-school and afterschool programs that offer strategies to reverse the obesity epidemic in kids.

Gortmaker authored HPRC’s Planet Health curriculum, which is designed for middle schools. He and co-Principal Investigator Lilian Cheung, lecturer in the Department of Nutrition, created the Eat Well and Keep Moving curriculum for elementary schools. These plans have helped thousands of students improve their diets and cut TV viewing time. Teachers can easily fit these curricula into existing classroom programs in areas such as math and language arts. The curricula offer simple ways for students to learn about and change their daily routine, alongside their peers. Over a period of years, as an entire schoolful of students hears and incorporates the same ideas into their lives about eating less and exercising more, cultures can gradually change. More than 15,000 copies of the curricula have been purchased across all 50 U.S. states and more than 20 countries.

Similarly, HSPH has teamed with YMCA, which nationally provide more than 10,000 afterschool programs for children in the U.S. In 2005, HSPH joined with the YMCA of the USA to form the YMCA-Harvard Afterschool Food and Fitness Project to help afterschool programs embed more physical activity and wholesome snack and beverage choices in their programs.

The project enables leaders, parents, and children at each Y afterschool site to choose strategies that will work best in their own program. Participants at one Y site may decide to offer water instead of juice at snack time to cut
calorie consumption, while another may find a new way to incorporate 30 additional minutes of physical activity into the day. Education combined with a sense of empowerment results in lasting change. In 2012, more than 300 YMCA afterschool programs across the U.S. were using the Food and Fun curriculum, reaching an estimated 97,000 children.

Beyond classroom and afterschool programs, Kawachi noted the kinds of simple changes in the greater world that could make a healthy difference:

1. Make an apple—not french fries—the default option that comes with a fast-food meal. We are more likely to accept the status quo than to go out of our way to change it.

2. Offer food on smaller plates and bowls—both in restaurants and at home. According to one study, container size can increase how much people serve and consume by 15 to 45 percent.

3. Give—and get—feedback. Research has shown a consistent relationship between dietary self-monitoring and weight loss, and between use of pedometers and increased physical activity. “We can be the architects of people’s decisions,” said Kawachi, “so that the natural choice tends to be the healthier one.”

“One of the most beautiful epidemiological charts I’ve seen has two graphs, each representing a 50-year time span, overlaying each other. One graph shows the declining number of hours that Americans are sleeping at night—its line is going down. The other shows the percentage of Americans who are overweight or obese—its line has the same slope and curvature as the sleep line, but it’s going up.

“The beauty of this chart is its simplicity. It encapsulates two important trends that we can’t deny are occurring. We have to be careful that we’re not oversimplifying their connection, but it begins the conversation.”

—Michelle Williams
Chair, Department of Epidemiology
Stephen B. Kay Family Professor of Public Health

Today, it’s conventional wisdom and a scientific truism that regular exercise is one of the healthiest habits around. But public health researchers weren’t always so certain that physical fitness was essential.

One of the first to scientifically document a link between physical activity and a longer, healthier life was Ralph Paffenbarger Jr., a pioneering epidemiologist who taught at HSPH from the 1960s to the 1990s. His attention-getting formula: Every hour of vigorous physical activity earns the exerciser an extra two or three hours of life.

When naysayers questioned whether that extra longevity consisted mostly of time spent exercising, the gentle yet tenacious researcher known as “Paff” to his colleagues observed that exercise not only “adds years to your life but life to your years.”

In 1960, Paffenbarger launched the College Alumni Health Study, which tracked the health and physical activity habits of 52,000 men who entered Harvard University and the University of Pennsylvania between 1916 and 1950. Findings from the ongoing study have conclusively shown that men who exercised strenuously, burning 2,000 calories a week, lived longer than those who didn’t. Similar findings have been documented for women through the School’s long-running Nurses’ Health Study (see page 32).

Paffenbarger took his findings to heart. He began running regularly in his 40s and became an avid marathoner. Paffenbarger remained an adjunct professor at the School until shortly before his death in 2007, at age 84.

Along with studies by Jeremy Morris of the London School of Hygiene and Tropical Health, Paffenbarger’s research helped prompt changes in federal health recommendations and laid the groundwork for the modern fitness movement. He and Morris were jointly honored in 1996 with the first International Olympic Committee prize for sport science.