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NBER NATIONAL BUREAU OF ECONOMIC RESEARCH

BULLETIN ON AGING AND HEALTH

How the Aging Process Changed During the 20th Century

In 1986, an ambitious project was launched to study the aging process of Union Army veterans, the first cohort to turn 65 during the twentieth century. Funded by the National Institute on Aging, The Early Indicators of Later Work Levels, Disease and Death project was led by a diverse team of investigators, including economists, physicians, a demographer, and a biological anthropologist. After a data set was assembled linking vast amounts of information for a sample of Union Army veterans, it was compared with more recent data sets, yielding surprising insights about how the aging process has evolved during the past century.

In **Changes in the Process of Aging During the Twentieth Century: Findings and Procedures of the Early Indicators Project**, (NBER Working Paper 9941), **Robert**

Fogel reports on the process and remarkable findings of the project, which to date have filled some 90 published papers, books, and Ph.D. dissertations.

The starting point of the project was to assemble a data set linking together information from a dozen sources — including decennial censuses, military records, Union Army pension records, and death certificates, among others — for a large sample of 45,000 veterans. This was no small challenge — all told, it takes 15,000 variables to describe the life-cycle history of each veteran. The project team devoted most of their efforts during the first 15 years of the project to overcoming the technical, organization, and analytical obstacles to assembling the data.

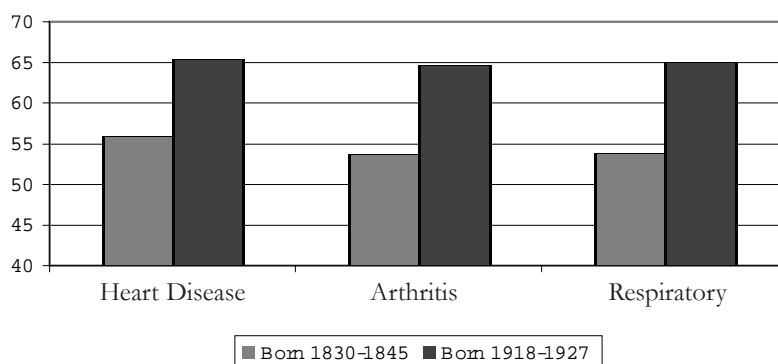
Researchers are only beginning to reap the rewards of the compilation of this rich data source, but

The NBER Bulletin on Aging and Health summarizes selected Working Papers recently produced as part of the Bureau's program of research in aging and health economics. The Bulletin is intended to make preliminary research results available to economists and others for informational purposes and to stimulate discussion of Working Papers before their final publication. The Bulletin is produced by David Wise, Area Director of Health and Aging Programs, and Courtney Coile, Bulletin Editor. To subscribe electronically to the Bulletin, please send a message to: ahb@nber.org.

early analyses have already generated unexpected and important discoveries. Some of the most significant findings relate to the incidence of chronic diseases. Prior to this research, the conventional wisdom held that as life expectancy has increased over the past century, people have come to spend more years plagued by debilitating chronic illnesses. The Union Army data set has provided several interesting insights on this question.

First, it has demonstrated that chronic illnesses affected young and middle-aged men to a much greater degree in the past than today. Among Union Army volunteers, one-quarter of men aged 20-24 and over half of men aged 35-39 were rejected as unfit to serve due to illnesses such as cardiovascular disease and hernias. Similarly, elderly men were more likely to suffer from chronic conditions in the past — of men aged 60-64 during the 1890-1910 period, 90 percent suffered from a chronic condition, as compared to 75 percent of same-aged men in 1994.

Figure 1: Average Age of Onset of Various Chronic Conditions for U.S. Men



Perhaps most striking, the average age of onset of various common chronic conditions increased by 10 years over an 80-year period, as illustrated in Figure 1, while life expectancy increased by just 6.6 years. In sum, these facts suggest that Americans are not only living longer than in the past, but are also healthier throughout the life cycle, even in old age.

These findings have spawned additional research aimed at understanding the decline in chronic illness over the past century. Some of this work suggests that occupational shifts and the elimination of exposure to infectious diseases at a young age were responsible for much of the decline in conditions such as respiratory diseases and back pain.

Other work suggests that chronic illnesses have not only become less prevalent over time, but also less likely to result in functional limitations such as blindness or difficulty walking.

Finally, a series of papers on mortality suggest that increases in birth weight and adult frame size, which are likely the result of better nutrition, have been important in reducing mortality among infants and adults.

The findings of this project have led some of its lead researchers to put forward a theory of “technophysio evolution,” which posits that humans have recently gained a degree of control over our environment that has allowed us to achieve rapid improvements in morbidity

and mortality. If correct, one implication of this theory is that some common assumptions used by economists — for example, that the rate of health deterioration with age is the same for people in different birth cohorts — are invalid, yielding flawed estimates of future health costs or of the value of health interventions.

While many critical questions about the aging process remain unanswered, longitudinal datasets such as the Union Army sample provide an invaluable tool for researchers in their ongoing search for the answers.

The Early Indicators project was funded by the National Institute on Aging. This summary was written by Courtney Coile.

How Hospitals Respond to Changes in Medicare Reimbursements

Since 1984, hospitals have been reimbursed for care provided to Medicare patients under the Prospective Payment System (PPS). Under this system, hospitals receive a fixed payment for each patient that is determined by the patient’s diagnosis-related group (DRG) at the time of admission; thus, reimbursement is unaffected by the hospital’s actual expenditures on the patient.

The motivation for switching from the old cost-plus system, in which hospitals were reimbursed based on actual expenditures, to the PPS was to provide hospitals with better incentives to contain costs and increase efficiency. Yet the PPS may also provide incentives for hospitals to behave in undesirable ways. For example, if certain diagnoses are more profitable because the reimbursement is larger relative to typical treatment costs, hospitals may respond by encouraging some types of admission and discouraging others, a potentially dangerous practice. Hospitals may also practice “upcoding,” switching patients from low- to high-paying DRGs, which would not affect patient outcomes but would increase Medicare costs. On the other hand, hospitals may

respond by providing higher-quality care in high-paying DRGs.

In **How Do Hospitals Respond to Price Changes?** (NBER Working Paper 9972), **Leemore Dafny** examines the effect of changes in DRG-specific reimbursement levels (DRG prices) on coding, admissions volume, and intensity of care. Typically, it is quite difficult to accurately measure the effect of DRG price increases, as prices are usually adjusted in response to changes in hospital costs, generating a relationship between DRG prices and expenditures or intensity that is not necessarily causal.

In her analysis, the author makes use of a change in DRG prices that was unrelated to changes in costs. 40 percent of DRG codes come in pairs — for each diagnosis such as cardiac arrhythmia, there was one code for patients aged 70 and above or with complications and a second code for patients under 70 without complications. Analysis suggested that costs for complication-free patients were similar regardless of age, so the age criterion was eliminated in 1988 and DRG prices were recalibrated. This resulted in an average 11 percent increase in DRG

prices for the top codes in each pair (those with complications) and an average 6 percent decrease in DRG prices for the bottom codes.

Using the 1985-1991 Medicare Provider Analysis and Review data, a 20 percent sample of all hospitalizations of Medicare enrollees, the author examines how hospitals responded to these relative price changes. She finds that hospitals upcoded patients to DRG codes with large price increases, garnering an estimated \$330-\$425 million in additional reimbursement annually. This response was sophisticated, with more upcoding in DRGs where the spread between top and bottom codes had increased more. For-profit hospitals were found to be more likely to engage in upcoding.

Next, the author examines whether hospitals responded by altering admissions volume or intensity of care, as measured by total costs, length of stay, number of surgeries, number of ICU days, and in-hospital deaths. She finds little evidence of changes in admissions volume or intensity of care for patients in the affected DRGs as a result of the price changes. However, she finds strong evidence that hospitals spent

the extra reimbursement funds on patient care in all DRGs. This suggests that hospitals may find it difficult to improve quality in specific diagnoses only, implying that hospi-

tals will compete on overall quality rather than trying to specialize.

This research was supported by the National Science Foundation, the National

Bureau of Economic Research, and the National Institute on Aging. It was summarized by Courtney Coile.

The Effect of Welfare Reform on the Insurance Status and Health of Low-Income Families

The Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) of 1996 enacted sweeping changes in the welfare program, including work requirements and lifetime limits on participation. As a result of PRWORA and earlier state reform efforts, as well as other factors such as a concurrent economic boom, the num-

ber of welfare recipients fell by 62 percent between 1993 and 2001, from 14.1 million to 5.4 million.

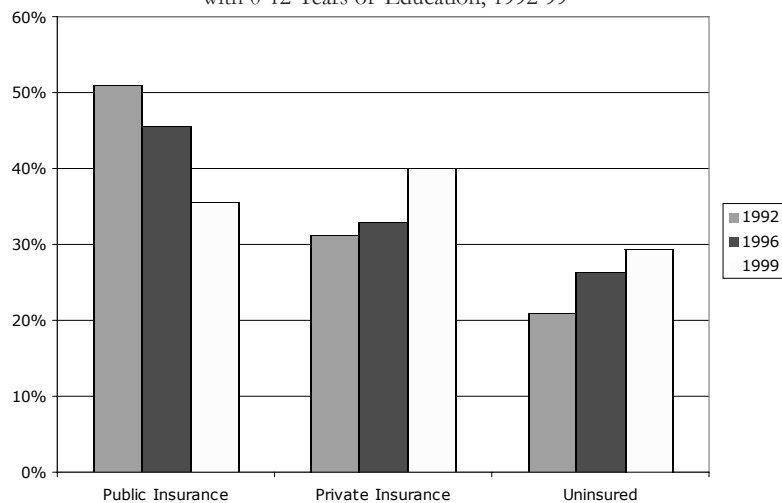
One potential unintended consequence of welfare reform may have been to increase the number of low-income families without health insurance. Under the old system, families on welfare were automatically enrolled in Medicaid, a government health insurance program for poor women and children. After welfare reform, women transitioning from welfare to work may have taken jobs that did not offer private health insurance benefits. While many of these families remained eli-

gible for Medicaid, at least on a transitional basis, they would now have to go through a separate, unfamiliar application process to enroll. In fact, there were striking changes in the health insurance status of low-educated single mothers during the 1990s, as illustrated in Figure 1 — many women moved off of public health insurance pro-

Using data from the Current Population Survey for the 1992-1999 period, the authors estimate whether living in a state with a higher welfare caseload in a given year was associated with low-educated single mothers in that state being more or less likely to have public insurance, have private insurance, or be uninsured. The authors use married mothers and single women without children, two groups largely ineligible for welfare, as control groups to assess whether observed differences in insurance status are the result of differences in caseload rather than other state-specific factors. The authors' findings indicate that the 13.6 percentage point drop in the welfare caseload between 1996 and 1999 resulted in a 3 to 4 percentage point decrease in Medicaid coverage, a 2 percentage point increase in employer-sponsored coverage, and a 0.5 to 2.5 percentage point increase in the proportion uninsured. The authors suggest that welfare reform may have been directly responsible for one-third of these changes, as they assume that reform led to one-third of the fall in caseload and find no evidence that changes in caseload due to welfare reform had a different effect on insurance status than changes due to other factors. The authors conduct a similar analysis for children of these mothers and find that the welfare caseload drop led to a 1 to 2 percentage point increase in the proportion uninsured.

Interestingly, these findings suggest a substantially smaller increase in the number of uninsured single mothers as a result of welfare reform than is suggested by "leaver" studies that follow women as they leave welfare. The authors suggest that the

Figure 1: Insurance Status of Single Mothers with 0-12 Years of Education, 1992-99



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grams, some gaining private health insurance benefits and others becoming uninsured. In **Welfare Reform and Health Insurance Coverage of Low-Income Families**, (NBER Working Paper 10033), **Robert Kaestner** and **Neeraj Kaushal** explore the extent to which these changes were the direct result of welfare reform.

In their analysis, the authors make use of the fact that the welfare caseload varied dramatically during the 1990s and that reductions in the caseload occurred at different times in different states, as some states enacted earlier welfare reforms.

discrepancy may be due to the fact that leaver studies cannot measure the effect of welfare reform on women who are now deterred from entering the welfare system.

Robert Kaestner and co-author **Elizabeth Tarlow** extend this work to study the effects of welfare reform on health in **Changes in the Welfare Caseload and the Health of Low-Educated Mothers** (NBER Working Paper 10034). The authors suggest that welfare reform may affect health behaviors and health status in several ways — by encour-

aging women to switch from unpaid household work to paid employment, by encouraging strategies to avoid public assistance such as cohabitation with a partner or family member, and by affecting access to health care.

Using the same empirical strategy and data from the Behavioral Risk Factor Surveillance System, the authors find that welfare reform had little effect on health, but was associated with decreases in binge drinking and increases in exercise. Notably, these lifestyle improve-

ments do not appear to be the result of employment, as they are experienced equally by those who left welfare for work and those who did not. While the authors suggest that further research would be helpful to understand the mechanisms for these lifestyle improvements, they conclude that welfare reform did not adversely affect the health of low-educated, single mothers.

This research was summarized by Courtney Coile.

NBER Profile: *David Laibson*



David Laibson is a Research Associate in the NBER's Programs on Aging, Economic Fluctuations, and Asset Pricing. He was a Fellow of the NBER's Aging Program in the 1997-98 academic year.

Laibson is a Professor of Economics at Harvard University. He serves on the editorial boards of the *Journal of Risk and Uncertainty*, the *Brookings Papers on Economic Activity*, the *Q.R. Journals of Macroeconomics*, and the *Journal of the European Economic Association*. Laibson is a member of the Russell Sage Behavioral Economics Roundtable and the Health and Retirement Study Monitoring Committee.

Laibson received his Ph.D in Economics from MIT and his A.B. in Economics from Harvard. He also

earned his M.Sc. in Econometrics and Mathematical Economics from the London School of Economics as a Marshall Scholar. He joined the Harvard faculty in 1994.

Laibson's recent work focuses on understanding how consumers make decisions about allocating their resources over time, including decisions about contributing to 401(k)'s. He is particularly interested in developing new economic theories incorporating insights from psychology and experimental economics.

Laibson is married to Nina Zipser, Harvard's Director of Institutional Research. When they have a free moment they enjoy tennis, snorkeling, hiking, snowshoeing, and cross-country skiing.

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