WOUNDING THE MESSENGER: THE NEW ECONOMY MAKES OCCUPATIONAL HEALTH INDICATORS TOO GOOD TO BE TRUE

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The U.S. Bureau of Labor Statistics and workers' compensation insurers reported dramatic drops in rates of occupational injuries and illnesses during the 1990s. The authors argue that far-reaching changes in the 1980s and 1990s, including the rise of precarious employment, falling wages and opportunities, and the creation of a super-vulnerable population of immigrant workers, probably helped create this apparent trend by preventing employees from reporting some injuries and illnesses. Changes in the health care system, including loss of access to health care for growing numbers of workers and increased obstacles to the use of workers' compensation, compounded these effects by preventing the diagnosis and documentation of some occupational injuries and illnesses. Researchers should examine these forces more closely to better understand trends in occupational health.

"It's a dramatic story and a great story for American workers and employers." The Actuarial Services Director of the National Council on Compensation Insurance, Inc., was hailing the steady decline in frequency of workers' compensation claims through the last years of the 20th century (1), including a 38 percent drop in workers' compensation benefits relative to wages between 1992 and 1999 (2). The Bureau of Labor Statistics (BLS) shared the enthusiasm, announcing in 2000 "Another Decrease in Days Away from Work Due to Workplace Injuries and Illnesses" over nine consecutive years—a decrease to the lowest incidence rate on record (3). The *New York Times* added that, "With little fanfare, the workplace has become a safer place to be. Since 1992, the number of work-related injuries and illnesses has fallen 25 percent. . . . [However] the cause of the trend toward fewer work injuries remains something of a mystery" (4).

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We argue in this article that, far from remaining a mystery, part of the reported decrease in injury rates grew naturally from a series of profound economic, legal, and political changes that hindered documentation of work-related illnesses and injuries in U.S. data sources. We explore the potential effects of several such changes on occupational health surveillance and propose an initial research agenda to address them.

BACKGROUND

The 1992–2000 trends disrupted a longstanding correlation between injury rates and upsurges in the business cycle. Robinson (5) observed that between 1948 and 1985 three measures of business cycle activity explained more than two-thirds of the variance in manufacturing injury rates as reported to BLS nationally and to the workers' compensation system in California. Surges in the business cycle predicted the greatest portion of increasing injury rates, perhaps due to faster work pace, longer hours, and greater proportions of inexperienced new hires performing hazardous tasks. Increased unemployment was associated with smaller increases in injury rates, explained by Robinson as resulting from unions and employees having less power to control working conditions when jobs are scarce. Yet the reduction in reported injury rates from 1992 coincided with a business boom, the longest economic expansion in U.S. history, and accelerated productivity growth in most sectors, including nearly all manufacturing industries (6, 7). Only falling unemployment levels, previously a weaker predictor than business activity, continued their association with decreased injury rates.[1] In addition, injury and illness rates fell in nearly all industries, including the most hazardous, meaning that they could not have resulted simply from export of dangerous occupations from the United States (8, 9).

The fall in reported injury and illness rates was also out of proportion with the decrease in reported rates of traumatic occupational fatalities. These last dropped just 9 percent between 1992 and 1998 (10, 11), while during the same years, BLS-recorded rates of occupational illnesses and injuries fell by around one-quarter and cases with days away from work by one-third (12).

Conway and Svenson's analysis (8) of these anomalies concluded that the falling injury rates resulted largely from improved safety practices and awareness among employers and a greater focus on prevention by both OSHA (Occupational Safety and Health Administration) and workers' compensation insurers. These authors determined that the trends did not result from increased underreporting, because workplace audits found similar rates of underreporting in 1996 as in 1987. This latter evidence, however, is based only on a comparison of companies'

[1] The authors did not recalculate Robinson's model for the era under discussion, because we were unable to obtain data on one of his key variables, rates of new hires. However, other measures of the business cycle indicate an unprecedented upsurge.

injury and illness reports to the BLS with other company documents. No independent sources of data were examined. Indeed, we would contend that some of the figures cited in Conway and Svenson's paper—reductions of more than 30 percent in rates of workers' compensation lost-time claims in just two years in Michigan, Missouri, and Kentucky; a more than 20 percent drop in BLS-reported injury and illness rates in two years in Hawaii, Georgia, and Maryland—strain credulity as reflections of true underlying workplace improvements.

We would like to propose an alternative interpretation based on a filter model developed to explain obstacles to documenting occupational illnesses and injuries in BLS, workers' compensation, and medical databases (Figure 1) (13). This model summarizes the series of steps that must take place before an injury or illness is captured by each of these systems. Each step is partially blocked by a conceptual filter (labeled *a* through *i*). We previously reviewed studies of various workplaces or datasets at particular points in time (not necessarily representative of U.S. workplaces as a whole) (13) that had documented and estimated the magnitude of loss of cases at steps in the reporting process:

- Filter *a:* between 29 and 94 percent of cases lost before reporting to a supervisor
- Filter *b:* around 90 percent lost at the step of time off from work
- Filter *d:* nearly 100 percent lost at the step of cases being designated work-related by a physician
- Filter *e:* about 60 to 80 percent lost at the step of charging medical care to workers' compensation
- Filters *f, g,* and *h:* as much as 90 to 99 percent lost (each) at the steps of employer recording of injuries and illnesses in OSHA logs, filing reports with workers' compensation agencies, and physician reporting to surveillance systems

Reasons given in the reviewed studies for failure to complete these steps included workers' fear of discipline, being labeled a complainer, or considered careless; perception of injuries as minor; perception of injuries as an inevitable part of the job; nonrecognition of work-relatedness; and company goals of no reported injuries, sometimes reinforced with incentive programs (13).

Additional reasons for not reporting injuries or illnesses to supervisors have been proposed in general discussions of this issue. These include concerns about perceived or actual risks of job loss, demotion or transfer to less desirable jobs or locations, loss of promotional opportunities, harassment, or even deportation. Managers who record injuries might experience poor performance evaluations, reduced merit raises or bonus awards, and increased paperwork, while failure to record may carry few negative consequences (13–17).

We argue here that a series of far-reaching economic, legal, and political changes of the 1980s and 1990s decreased the permeability of filters *a* through *g* in

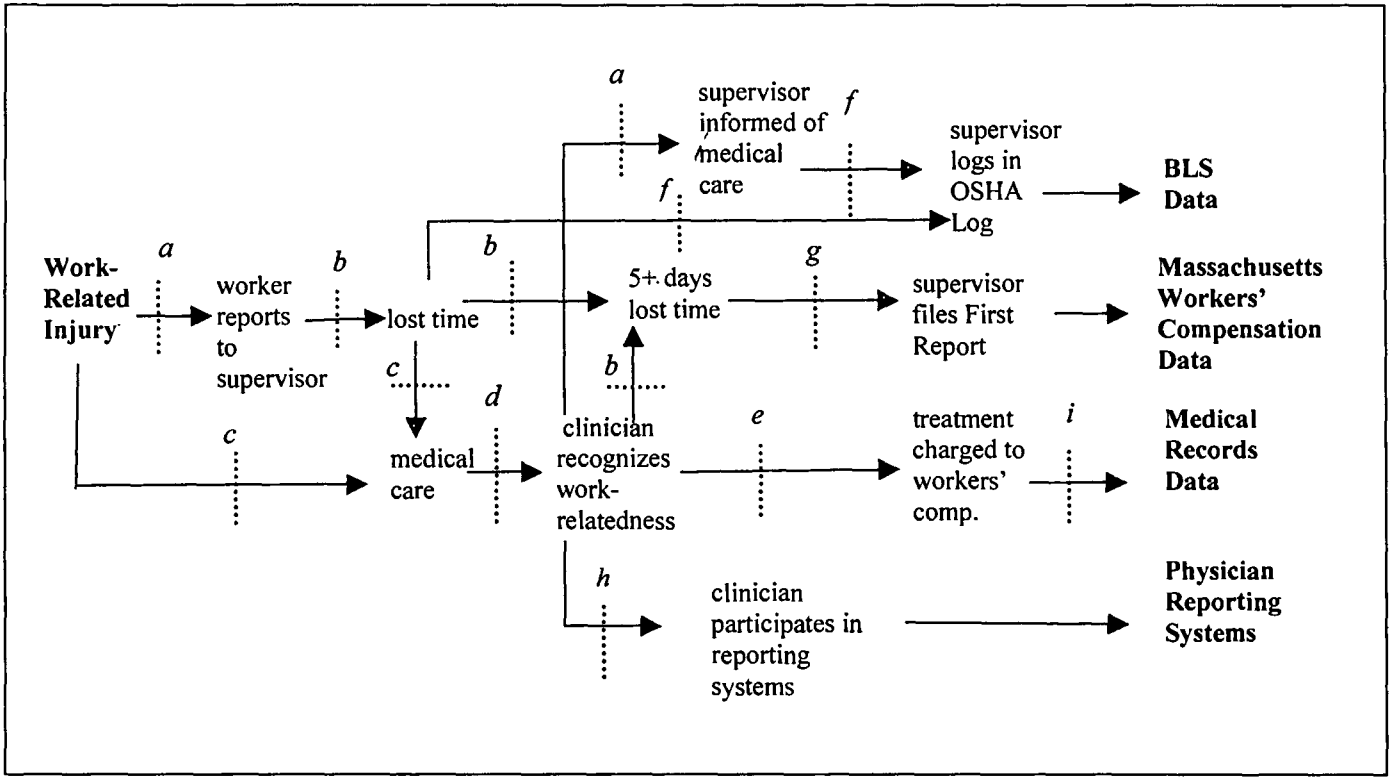

Figure 1. Simplified flowchart of events necessary to the documentation of work-related injuries and illnesses (filters represented as dotted lines). Redrawn from Azaroff, Levenstein, and Wegman (13).

the model. These changes, among others, exerted a downward pressure on documentation of occupational injuries and illnesses, which by the early 1990s overwhelmed the business cycle factors traditionally associated with trends in reported rates. By affecting workers' compensation records, medical records, records of hours worked, and other documentation, as well as OSHA logs, these changes are likely to obscure underreporting sought by the plant audits cited by Conway and Svenson (8).

The first part of this article addresses changes that occurred during the 1980s and 1990s that may reasonably be expected to have discouraged employees and supervisors from reporting injuries and illnesses, significantly decreasing the permeability of filters *a, f,* and *g:*

1. Growth in economic insecurity
2. Exclusion of increasing numbers of immigrant workers from reporting systems
3. Spread of incentive systems that reward low levels of reported injuries and illnesses

The second part describes the growing difficulty of documenting medical diagnosis of work-related conditions, obtaining workers' compensation insurance coverage for medical care, and obtaining workers' compensation partial-wage replacement for work time lost to occupational health problems, thus decreasing the permeability of filters *b, c, d,* and *e:*

1. Declining access to medical care
2. Increasing obstacles to establishing work-relatedness
3. Workers' compensation reform

GROWING OBSTACLES TO REPORTING OR LOGGING OCCUPATIONAL ILLNESSES AND INJURIES

Growth in Economic and Job Insecurity

In 1999, Federal Reserve Chairman Alan Greenspan noted in a speech: "The rapidity of change in our capital assets, the infrastructure with which all workers must interface day-by-day, has clearly raised the level of anxiety and insecurity in the workforce. As recently as 1981, in the depths of a recession, International Survey Research found 12 percent of workers fearful of losing their jobs. In today's tightest labor market in two generations, the same organization has recently found 37 percent concerned about job loss" (reported in 15, 18).

As Greenspan suggested, growth in job insecurity stemmed in part from the restructuring of the U.S. economy that started in the mid-1970s. The development of electronic networking, faxes, and computerized inventory systems combined

with political decisions such as the U.S. free trade agreement with Canada in 1988, the 1993 North American Free Trade Agreement (NAFTA), and U.S. entrance into the General Agreement on Tariffs and Trade (GATT) in 1994 to deregulate markets and weaken trade barriers (19–21). These changes led to an increase in multinational corporations' control of international and U.S. markets and to exchange rate volatility. Companies started to integrate product markets and shift production among factories contracted independently around the world. This economic globalization accentuated the trend of major U.S. companies' transfer of resources from manufacturing to services and financial speculation. To compete in this new economic environment, companies cut wages and benefits, transferring costs of living, health services, sick time, and retirement from employers to workers' families and social networks. Some large employers shifted production to lower-wage workers, while others just threatened to shift production so as to discourage demands for higher wages or benefits (20, 22–24).

More employers sought flexibility to take on and shed employees at irregular, short-term intervals according to market changes. De-skilling jobs while maintaining work environments that encourage turnover enabled more employers to hire a short-term, low-skilled workforce, preempting eligibility for benefits and permitting the use of job-training funds for new hires rather than employee development (25, 26). To these ends, employers increasingly turned to *non-union employment, contingent employment,* and *informal employment.* Each of these is discussed below.

As job security declined, workers also became less able to obtain adequate employment following job loss. Unprecedented for the postwar period, unemployment levels consistently exceeded 5 percent for 25 out of 26 years starting in 1971 (27). *Falling real wages* and *welfare reform* concurrently increased the probability that job loss would lead to poverty, homelessness, and hunger, as also discussed below.

Non-Union Employment

Potential Effects on Occupational Health Data: Unions can help to educate their members about workplace health and safety and support them in recognizing and reporting health effects and navigating workers' compensation. Union membership can also protect employees from retaliation for reporting work-related injuries or illnesses. Because unionized jobs are more likely to be secure, pay higher wages, and provide health insurance, deunionization reinforces trends toward insecure, low-wage, unbenefited work, as well as difficulties in reporting health problems.

Phenomema Underlying the Change: The economic restructuring described above contributed to the decline of relatively highly unionized industries such as manufacturing and public services. New technologies frequently started in small-scale, entrepreneurial operations not conducive to unionization. New technology and improved infrastructure allowed large companies to disperse

production from large, centralized, unionized facilities near railways to smaller, isolated plants without unions (25). The increasing use of subcontracting and temporary arrangements also helped prevent unionization (28).

President Reagan's firing of striking air traffic controllers in 1981 marked the beginning of an era of anti-union activity. By the end of the century, two-thirds of U.S. companies facing union organizing drives hired consultants to develop anti-union campaigns, including captive-audience meetings, one-on-one meetings between workers and supervisors, and predictions of job loss in the event of unionization (28). The numbers of employers threatening to close plants in response to union organizing drives grew significantly from the mid-1990s, extending to all textile and apparel manufacturers and 68 percent of those in mobile industries (23).

In the 1990s, the National Labor Relations Board (NLRB) found more than 20,000 U.S. workers per year to have experienced firing or wage loss in reprisal for attempting to organize—triple the number in the 1960s. Pro-union employees were illegally fired in one of four organizing drives. Employers who commit these reprisals are often able to delay legal proceedings for many years, refusing to rehire illegally dismissed workers or to recognize legally elected unions, and face no penalties other than back pay to illegally fired workers, minus other income the workers earned while terminated. Even when workers succeed in electing union representation that is recognized by the employer, employers can delay negotiating a first contract for years, and in one-third of newly organized businesses they avoid negotiating a contract altogether. Welfare recipients in many states lose all benefits if they strike or refuse to cross a picket line, and some states forbid unionization of welfare-to-work employees. And while the numbers of unfair labor practice complaints filed with the NLRB tripled between the 1950s and the late 1990s, NLRB staffing fell from almost 3,000 employees in 1980 to almost 2,000 in 1998 (28).

Magnitude of the Change: In 1981, the annual number of union recognition elections declined from more than 7,000 to around 3,400, and fell below 3,000 over the next 15 years (24). Union membership among nonagricultural employees fell from 24.1 percent in 1977 to 13.6 percent in 2000 (29). By 2001, just 9 percent of private sector workers were union members (30).

Contingent Work

Potential Effects on Occupational Health Data: Contingent employment is employment structured to be short-term, part-time, or temporary, including temporary, on-call, or contracted work, and day labor (31). Day laborers and temporary employees can be dismissed from day to day. These and contracted workers depend on continually obtaining new positions, or hope to be promoted to permanent positions. The resulting insecurity dampens contingent workers' willingness to demand higher wages even during periods of low unemployment (22), and may discourage workers from reporting health problems. Employers

of contingent workers have little incentive to document occupational health problems or keep injured workers, so plant audits such as those cited by Conway and Svenson (8) would be unlikely to identify contingent workers who experienced health problems then moved on. Australian studies have reported that contingent workers and groups of workers concentrated in precarious jobs are least likely to lodge compensation claims. In these studies, workers on short-term contracts were discouraged from filing so as to avoid impairing future work prospects. Contingent employment may compound underreporting, since it is associated with increased hazards as well as decreased reporting of health problems (32, 33). In addition, temporary workers in the United States are nearly twice as likely as workers with traditional employment arrangements to work in the relatively high-hazard industries of manufacturing and construction (34).

Additional factors discourage the recording of occupational illnesses and injuries affecting contingent workers. In most states, self-employed workers and independent contractors are ineligible for unemployment insurance or workers' compensation (31), reducing incentives to report work-related illnesses and injuries or take time off to recover. Many contingent workers have very low incomes, decreasing their ability to withstand periods of unemployment. Almost 30 percent of workers employed through temporary agencies, and more than 21 percent of temporary workers employed directly by their place of employment, have family incomes below $15,000, compared with 7.7 percent of standard full-time workers (31). Very few contingent workers are able to join labor unions. Contingent workers rarely stay at a workplace long enough to organize or join a union. Groups of these workers may be unable to demonstrate the "community of interest" required for legal recognition of bargaining units. If temporary agency or contract workers do attempt to unionize, employers can simply cancel their contracts. Both the leasing agency and workplace employer can refuse to recognize workers as their employees or can deny their rights to join existing bargaining units (28, 31).

Phenomena Underlying the Change: During the 1980s and 1990s, employers increased the use of contingent employment to respond to volatile markets, reduce labor costs, maximize profits, and help prevent unionization (32, 35, 36). Using independent contractors or temporary workers reduces employers' costs for Social Security and Medicare taxes, unemployment insurance, workers' compensation insurance, and employee benefits (31). Business services grew dramatically: revenue for Labor Ready labor leasing company grew from about $15 million in 1993 to $607 million in 1998 (37). Increasing numbers of workers had access only to temporary employment, though most would have preferred permanent jobs (31).

This employment trend flourished in new and growing industries, such as the electronics/computer industry, which became the largest manufacturing employer in the United States (38). The industry's small margins, erratic needs, and small specialty orders, and the quickly changing processes of electronics assembly, led

companies to focus on "core competencies" while contracting out most non-specialty tasks (39).

Magnitude of the Change: From 1982 to 1998, the number of jobs in the U.S. temporary-help industry grew by 577 percent. By 1997, the BLS calculated that 5.6 million workers, or 4.4 percent of the workforce, held jobs designed to be short-term. These excluded the 43 percent of agency temps and 72 percent of on-call workers who expected to stay in their jobs for more than a year. Defining "contingent work" as "any work arrangement that is not long-term, year-round, full-time employment," the U.S. General Accounting Office estimated that by 2000, contingent workers comprised 30 percent of the country's workforce (31).

The Informal Economy

Potential Effects on Occupational Health Data: "Under-the-table" work provides neither the administrative structure nor the incentives for workers to report health problems, or for employers to document them. Under-the-table workers enjoy virtually no protection against job loss in return for reporting problems, while the desire to avoid paperwork and insurance is among the main incentives for employers to hire through this mechanism.

Phenomena Underlying the Change: Sassen (40) argues that the shift from mass production of goods to a service economy weakened the political, social, and economic forces that standardize working conditions. Producers polarized into two groups: finance and specialized services with extremely high profit potential, and low-profit enterprises. High-profit businesses bid up the prices of such business inputs as commercial space and industrial services. Many low-profit firms therefore had to reduce costs of legal requirements regarding wages, working conditions, physical plant, and insurance. In addition, polarization in earnings between high-income and very-low-income groups forced low-income workers to seek additional, untaxed income through under-the-table employment, while pushing high-income people to seek labor-intensive services—cleaning, maintenance, customized production, and so forth (40, 41).

Magnitude of the Change: The informal economy does not lend itself to direct study. However, this sector recently grew to an estimated 10 to 20 percent of gross national product (41, 42). Since the late 1980s, numbers of day laborers, many of whom work under the table, have increased significantly in many states (37). By 2000, approximately 11,000 day laborers (including under-the-table and formally employed) worked in and around New York City (43).

Low-Wage Work

Potential Effects on Occupational Health Data: Low-wage workers can risk immediate impoverishment if they lose their jobs or promotional opportunities as a consequence of reporting injuries. Families with low incomes are less able to withstand the long periods typically required to contest denied workers' compensation payments, or the waiting periods and reduced income involved in

obtaining even noncontested compensation. Low-income workers may therefore avoid reporting their injuries or illnesses.

Phenomena Underlying the Change: During the 1980s and 1990s, economic globalization, rising interest rates, failed mergers and acquisitions, a Soviet grain embargo, and other changes depressed major U.S. industries, including steel, auto manufacturing, mining, agriculture, and oil. Employers responded with demands for wage and benefit concessions (19, 21, 44). Shrinking job opportunities also depressed wages. Economic policies starting in the 1970s deliberately increased U.S. unemployment to reduce inflation, and unemployment replaced historical labor shortages (44). Growth in international trade cost the United States an estimated several million jobs between 1979 and 1999. At the same time, many major U.S. corporations outsourced low-skill jobs to low-wage countries, resulting in unemployment and wage cuts for U.S. workers with a high school education or less. Automation also eliminated jobs, while job de-skilling with new technologies converted high-skill, valued jobs to low-wage, low-skill positions (19, 25, 39). The de-unionization discussed above also depressed wages. For example, systematic closing of unionized plants and opening of equivalent nonunion plants decreased meatpackers' wages 25 percent between 1981 and 1984 (26). Janitors' wages also fell, as office and retail buildings with revenues far in excess of labor costs outsourced cleaning and maintenance services to contractors whose labor costs can consume more than 75 percent of sales revenue (45).

Magnitude of the Change: The percentage of U.S. working families living below the poverty line rose steadily from 7.5 percent in the late 1970s to 11.5 percent by 1995 (46). By 1997, 28.6 percent of all U.S. workers were earning wages so low that full-time, year-round work would not produce enough earnings to lift a family of four above the poverty level (47), itself an inadequate measure of housing, clothing, childcare, transportation, and other expenses.

Welfare Reform

Potential Effects on Occupational Health Data: Until 1996, poor families with children were entitled to Aid to Families with Dependent Children (AFDC) benefits, which provided some protection for low-wage workers who cycled in and out of paid employment according to changes in the job market, family health problems, danger from domestic violence, and access to transportation and childcare. With welfare reform, recipients entered competition for few available jobs against unemployed workers with higher levels of education, better job experience, and fewer family responsibilities (48, 49). We expect that the absence of the welfare safety net obliges workers not only to accept more dangerous working conditions but also to avoid risking their jobs by reporting problems.

Phenomena Underlying the Change: As noted above, economic restructuring and deliberate fiscal policy led to low wages and high unemployment during the 1980s and 1990s. Yet public campaigns by politicians, think tanks, and radio promoted the idea that these problems resulted from government funding of

means-tested public assistance. This campaign enabled Congress to cut such programs with little public protest. By the late 1990s, no major U.S. political figure was willing to publicly support AFDC (44). In 1996, the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) eliminated the entitlement to benefits for poor families with children. PRWORA cut $55 billion over six years from welfare, food stamps, and disability income support. This law placed a maximum five-year lifetime limit on receiving federally funded benefits, but allowed states, and even counties, to set more stringent limits and eligibility rules (49–51).

Magnitude of the Change: The numbers of U.S. families receiving welfare benefits fell from 5 million in 1994 to 2.2 million in 2000 (52). Of recipients, approximately 135,800 families each month in 1998 received reduced or no benefits as a penalty for noncompliance with various requirements (50). No comprehensive system tracks the economic status of former welfare recipients, but several state-based studies and local surveys concluded that most post-PRWORA welfare leavers earned poverty-level wages (51). Two-thirds of New Jersey residents formerly receiving welfare continued to live below the poverty level in 1999, and one-half experienced serious housing problems, including eviction, staying in shelters, or moving in with other families (53). Three-quarters of sampled Illinois workers who had left welfare for work reported a 1998 income below $15,000 (54). Of 39 current or former welfare recipients interviewed in a Massachusetts hospital in 1999, 18 percent reported food insecurity (49).

Exclusion of Growing Numbers of Immigrant Workers from Reporting Systems

Potential Effects on Occupational Health Data: Even as the U.S. economy grew increasingly dependent on low wages and high labor flexibility, poverty and violence forced more people to leave their home countries for the United States. The proportion of immigrants in the U.S. population rose steadily from 4.7 percent in 1970 to 10 percent in 2000. More immigrants were granted permanent legal residence in the United States during the 1980s than at any other time since the 1910s (55, 56). By 2000, an additional estimated 7 million immigrants lacked legal documentation (57).

Simply being an immigrant by no means implies unwillingness to report occupational illnesses or injuries. However, just as these populations arrived, immigration reform measures (discussed below) legally forbade large sectors of the workforce from living or working in the United States, but provided neither the policies nor the resources for consistently enforcing these prohibitions. Employers thereby gained access to a labor force whose members could be hired with impunity but terminated summarily by invoking the new laws, a kind of unprotected labor underclass.

Almost 80 percent of immigrants in the United States have legal documentation (56). Yet some immigration reform measures, and welfare reform, were directed against all immigrants, including the documented. Other measures targeted only undocumented immigrants but indirectly affected the documented and even U.S.-born members of minority groups. All reforms potentially discouraged worker contact with public institutions, including OSHA and workers' compensation agencies.

The effects of these phenomena on occupational health data collection are, by their nature, difficult to calculate. However, we believe they are significant. Excluding immigrants who are high-wage professionals, many immigrant workers face particularly hazardous working conditions that sometimes worsen with their arrival (e.g., the speed of work at meatpacking plants that increased as the workforce became largely Mexican). They consequently suffer disproportionately high rates of severe occupational injuries and illnesses, yet have fewer opportunities to safely report these problems to supervisors or collect workers' compensation. Moreover, immigrants tend to work in industries and employment arrangements that receive relatively little attention from OSHA (16, 43, 58–62). Indeed, the industries reporting the greatest drops in frequency of workers' compensation claims during the 1990s were precisely those newly staffed by immigrants: restaurants, clothing manufacturers, grocery stores, and hotels (1).

Effects on occupational health surveillance may reach well beyond the immigrant population, relaxing reporting practices for other employees in the same industries. Awareness of a pool of available workers whose injuries are likely to go undocumented may dissuade other workers from reporting their own health issues.

Phenomena Underlying the Change: We discuss here dependence on immigrant labor, factors increasing immigration to the United States, and immigration reforms and their selective enforcement.

U.S. Dependence on Immigrant Labor

During the past decades, inexpensive services subsidized by low-wage immigrants increasingly supported the high living standards of nonimmigrant U.S. citizens. Local economies and entire industries, including garment work, meatpacking, poultry processing, residential construction, plant nurseries, fruit orchards, restaurants, and field agriculture, continued to depend economically on immigrant labor and intensively recruited workers abroad (16, 26, 36, 63–66).

To meet new needs for cost-cutting in the 1980s, industries such as building services and meatpacking replaced largely unionized, high-wage jobs with nonunion low-wage jobs targeting immigrants (26, 45). The electronics manufacturing industry replaced well-paid, benefited jobs held mostly by U.S. men with low-wage, dead-end positions held mostly by women, including immigrants from Mexico, Vietnam, the Philippines, and Korea (44, 67). Apparel manufacturers'

needs for immediate access to image, consumers, supplies, and support services kept a significant proportion of their production in the United States, even while they subcontracted production so they could hire and fire according to the latest demands of the market and avoid responsibilities for benefits, wages, and working conditions. Thus the garment industry provided low-wage jobs in poor conditions out of compliance with labor laws, suiting it to vulnerable immigrant workers (20, 64).

"Push" Factors Bringing Immigrants to the U.S.

We focus here on principal sources of recent immigration. Mexico was the largest source of legally documented immigrants in the 1990s. The greatest increase in proportion of documented immigrants in 1988–1994 came from Europe, particularly the former Soviet Union and Poland (68). In 2000, undocumented immigrants included almost 3 million Mexicans, 335,000 Salvadorans, 165,000 Guatemalans, 105,000 Haitians, 75,000 Dominicans, 70,000 Poles, and 65,000 Colombians (57).

Structural Adjustment: Since the late 1970s, the World Bank and International Monetary Fund (IMF) imposed Structural Adjustment Programs (SAPs) in most poor countries. SAPs involve currency devaluation, reductions in real wages, elimination of subsidies for basic goods, reductions and privatization of public services, corporate and institutional downsizing, weakened labor laws, and the displacement of small farmers and merchants by multinational corporations. Typical results have included increased unemployment, underemployment, and temporary employment and increases in severe poverty and homelessness. Falling wages push more wage-earners per household into the labor force even as available employment shrinks. More people need to work more hours under deteriorated conditions while losing public or employer assistance for unpaid work such as childcare and care of the sick and elderly (69–74).

In 1982 the IMF imposed trade liberalization in Mexico, including reductions in assistance to farmers (73). In 1985 Mexico joined GATT, leading to the elimination of price and capital flow controls (75). NAFTA further cut subsidies, tariffs, and price supports for Mexican agriculture and increased U.S. agricultural exports to Mexico. An estimated 15 million Mexican farmers were expected to leave agriculture (76). Unemployment levels in Mexico more than doubled between 1987 and 1999. The increase in prices of basic consumer goods was two and a half times the increase in the minimum wage. Health, nutrition, housing, and education indicators dropped sharply. By 1995 Mexico was experiencing the worst depression since the 1930s, with more than half the population in poverty. The country increasingly depended on the $3 to 4 billion per year remitted by emigrants. These changes were predicted to add hundreds of thousands of immigrants to the United States. Many remained undocumented because of limitations on legal temporary migration and a several-year backlog in applications for legal immigration (37, 73, 76, 77).

Since 1992, trade deregulation brought imports of U.S. grains and Asian coffee that forced many Central American farmers to abandon their land. IMF policies increased obstacles to credit, irrigation, and land for farmers. Liberalization of interest rates prevented people without capital from starting businesses, and privatization of public services and utilities erased job and income security for public workers. By 2000, one million Central Americans faced serious food shortages, and an estimated 700,000 were at risk of starvation (78).

SAPs were implemented in Eastern European countries beginning in 1990. Between 1989 and 1994, unemployment in the region reached 10 to 15 percent. Following the 1990 economic reform in Poland, unemployment grew from less than 3 percent in 1989 to 16 percent in 1993 (79). Real wages fell by more than one-third from 1990 to 1992 (80). Between 1989 and 1993, the proportion of Poles living in poverty doubled (81).

Structural adjustment started in the Dominican Republic in 1982 with an emphasis on free-trade zones, where basic hourly labor costs fell from $1.33 in 1984 to $0.56 in 1990 (70, 74). In 1992 the minimum wage in the zones equaled one-sixth the minimum monthly expenses for a family of five. Education and health care programs were cut, and urban maternal mortality increased by nearly half. Remittances from emigrants became the country's primary source of foreign exchange (70, 74).

Low-Intensity Warfare: From 1979 the United States significantly increased funding for military conflicts in countries that became important feeders for the domestic labor force: $6 billion to support the government of El Salvador (82), hundreds of millions of dollars to the government of Guatemala (83, 84), more than $1 billion to the government of Colombia (85). The United States also increased its direct involvement, for example training and equipping Salvadoran and Guatemalan armed forces and overseeing the addition of 47,000 men to the Salvadoran army of 16,000 (82, 84). The 1979–1991 Salvadoran Civil War resulted in 75,000 deaths and approximately 2 million exiles (82). A 1986 earthquake left an additional 200,000 people homeless. In the 1980s, one-fifth of the Salvadoran population left their country to live in the United States. Most remained undocumented. Between 1983 and 1990, less than 3 percent of Salvadoran applications for asylum were approved by the United States (86). The 1986 immigration amnesty excluded most Central Americans (87). The 1990 Immigration Act granted Extended Voluntary Departure status to just a subset of Salvadorans in the United States and required beneficiaries to return home in 1991 (86). The Guatemalan war against a peasant and indigenous uprising destroyed 440 villages in 1981–1983 alone, while the "guns and beans" program required participants to kill other citizens suspected of opposing the government. The war killed an estimated 200,000 civilians and displaced more than 1 million. The United States admitted few Guatemalans as refugees, because their government was an ally (83, 84, 86).

Despite Haiti's history of extreme poverty and violence, all U.S. administrations denied Haitians' status as political refugees. Of more than 22,000 Haitians interdicted between 1981 and 1990, 11 were permitted to pursue asylum claims (88). Around 2,000 Haitians were killed in the two weeks following a 1991 coup d'état, and subsequent assassinations, rape, and torture displaced tens of thousands—but the United States pursued a policy of forcibly returning them to their country (86, 89). During this era the civil war in Colombia displaced around 2 million people and killed tens of thousands, and destroyed extensive areas of crops (85).

Immigration Reform and Anti-Immigrant Measures

The Immigration Reform and Control Act of 1986 (IRCA) instituted civil and criminal penalties for employers who knowingly hire immigrants without legal work authorization. In response, some employers mistakenly refused employment to immigrants with legal work documents or even to any applicant who seemed foreign. IRCA allowed employers to prevent reinstatement of employees fired or reported to immigration authorities in retaliation for asserting labor rights. The law reduced access to formal employment for millions of undocumented and documented workers, including the 100,000 documented Central Americans denied work permits due to an Immigration and Naturalization Service (INS) error (37, 63, 86).

The Illegal Immigration Reform and Immigrant Responsibility Act (IIRIRA) of 1996 restricted access to asylum, limited types of acceptable work authorization documents, and strengthened penalties for violating immigration law. IIRIRA required the Social Security commissioner to report employees with unauthorized Social Security numbers to the INS, and facilitated employers' contacting the INS to verify employees' immigration status. Employers participating in INS pilot projects were permitted to lay off workers pending confirmation of their status (37, 63, 90, 91).

PRWORA excluded most legally documented immigrants from eligibility for food stamps, Medicaid, Temporary Assistance to Needy Families, and Supplemental Security Income. Food stamp benefits ended for 800,000 to 900,000 families of documented immigrants. (Restrictions were amended in 1998.) By 1998, one study found that four-fifths of sampled legal immigrants in some areas faced food insecurity, with 40 percent experiencing actual hunger (92, 93).

The Anti-Terrorism and Effective Death Penalty Act (AEDPA) of 1996 expanded the types of criminal offenses for which legally documented noncitizens can be deported, and eliminated judicial review of removal orders. For example, the law required the government to detain and deport a legally documented resident for possessing more than 30 grams of marijuana (91).

IRCA, the Immigration Act of 1990, and IIRIRA authorized the near doubling of the Border Patrol, which began to implement sophisticated military technology and gained the support of military patrols in locating and deporting the undocumented (76, 91).

INS workplace raids, local ordinances, and popular hostility further influenced immigrants to avoid contact with public institutions. Some documented residents were targeted by the INS because of their accent or appearance, and California police routinely harassed and forcibly dispersed groups of day laborers, including the legally documented (16, 37, 94, 95). Political campaigns of the early 1990s broadcast frightening images of immigrants crossing into the United States (45). Residents of Farmingville, New York, held weekly protests against immigrant workers, and in 2000, men pretending to hire day laborers murdered two Mexican workers on Long Island (43).

Selective Enforcement

The new laws and responsible agencies allowed employers broad discretion in choosing whether, when, and how to enforce restrictions on the employment of immigrants. IRCA mandated no procedures for verifying work authorization documents, thus enabling employers to knowingly hire undocumented immigrants then at any moment "discover" the employees' status and have them fired or deported (63).

Industry needs for undocumented immigrant workers received support from federal agencies. The INS negotiated with agricultural employers to delay enforcement of immigration controls during seasons when employers needed workers. In 1996 more than half of Florida migrant farm workers surveyed were undocumented, but almost none had been denied a job on this basis (63). During the publicity campaigns focused on the Mexico border, illegal immigrants as a proportion of California agricultural workers increased from less than 10 percent in 1990 to nearly 40 percent in 1997. Meatpacking companies continued to systematically recruit and import documented and undocumented Mexicans (16, 26, 76) and demanded halts to INS enforcement programs (96, 97). INS investigations of poultry and meatpacking plants were suspended following complaints by members of Congress on behalf of the employers (36).

Less than 0.5 percent of U.S. workplaces were inspected during the eight years after IRCA (98). The INS conducted 15,000 investigations of employers in 1989, 6,000 in 1995, and 1,966 in 2000. Just 24 employers nationwide were convicted for immigration violations in 1996 (36, 76). Eighty-six percent of INS investigations of companies for hiring undocumented workers resulted in no fines (99). Although 40 to 50 percent of illegal immigrants enter the United States legally and overstay their visas, funding for preventing this did not increase. In fact, reinforcement of the border disrupted patterns of people staying illegally for short periods and then returning home (76).

INS officials have publicly acknowledged that employer demand for workers discourages enforcement and that the agency takes little action to prevent employment of undocumented workers except when employers report workers who try to organize a union, bargain a contract, seek improvements in working conditions, or exercise the right to strike (28, 63, 64, 99–101). Employers use

threats of INS raids to replace workers who report symptoms, thus reducing reportable and compensable conditions (26). Even when workers can prove that dismissal resulted from such illegal retaliation, they cannot obtain reinstatement without quickly regularizing their immigration status, which is usually impossible (28).

In all, no evidence suggests that the supply of immigrant workers significantly decreased following IRCA, IIRIRA, or the militarization of the border. The undocumented population continued to grow by about 275,000 annually (63, 76, 102). Immigration reform simply created a large population of workers with little recourse for addressing occupational hazards.

Spread of Safety Incentive Programs

Potential Effects on Occupational Health Data: Traditional safety incentive programs provide workers and their supervisors with financial rewards, bonuses, recognition, and promotions for reporting few injuries and illnesses. Prizes for reporting low levels of injuries have included all-expense paid trips to Disney World, big parties, new trucks, checks for $10,000, household appliances, and color televisions. By contrast, adverse consequences of reporting can include wage reductions, loss of overtime, reprimands, suspensions, transfer to undesirable shift or locations, or drug testing (103–107). Incentives for not reporting work-related illnesses and injuries can be compounded when rewards for co-workers or supervisors depend on low reported rates for an entire team or department, especially when rewards increase with time. People with work-related injuries may face peer pressure, up to and including violence, to not report (104, 105, 108). Employees have reported concealing all but the most severe injuries, not sounding accident alarms, and secretly seeking medical treatment on their own time and with their own resources to avoid reporting injuries (15, 106).

Magnitude of the Change: Few data are available on the growth of traditional safety incentive programs. Anecdotally, behavior-based approaches, including incentive programs as well as behavioral methods that do not reward nonreporting, have become increasingly popular since the late 1990s (109). Linking managers' salaries to safety records and injury losses has also become more common (14).

CHANGES THAT PREVENT MEDICAL DIAGNOSIS OF WORK-RELATED CONDITIONS

Declining Access to Medical Care

Potential Effects on Occupational Health Data: Medical diagnosis of work-relatedness is usually necessary for granting lost time or restricted duty—triggers for inclusion of injuries and illnesses in workers' compensation databases and BLS records. Medical care per se triggers requirements for recording injuries in

the OSHA logs that provide the information for BLS data. In principle, employees hurt on the job should obtain medical care covered by workers' compensation, but barriers to this system described below impel many to rely on other means of payment (13, 110). Therefore, lack of health insurance can prevent diagnosis, especially for nontraumatic conditions. A recent U.S. survey found that 34 percent of adults without medical insurance, versus 9 percent of the insured, reported postponing seeking health care that they needed but could not afford; 20 percent of the uninsured, versus 3 percent of the insured, reported that they needed medical care for a serious condition but were not able to obtain care. Of the uninsured, 36 reported having no regular source of care, and 54 percent reported no doctor or clinic visit in the past year (111). In addition, inadequate access to services can prevent clinicians from recognizing subtle or gradual changes involved in occupational illness or chronic injuries (112). These obstacles especially affect low-wage workers, who are also affected by disproportionately high levels of workplace hazards. Lack of access to medical care among the working poor may therefore mean loss of large numbers of injuries and illnesses to occupational health record-keeping systems.

Phenomena Underlying the Change: Real-dollar costs of health insurance more than doubled during the 1980s and 1990s, leading employers to restrict eligibility for health benefits and increase employees' shares of premiums. Between 1977 and 1998, the average annual health insurance premium share per worker increased three and a half times while real wages declined. Many low-wage employers stopped providing health insurance benefits or transferred, on average, higher costs to their workers than did high-wage employers, rendering the coverage practically unobtainable. Most low-income adults also lacked access to means-tested programs. For example, full-time workers at minimum-wage jobs are ineligible for Medicaid in 32 states (111). Obstacles such as lack of transportation to clinical services and inflexible work and childcare schedules also preclude medical care for some working poor (113). Fifty-seven percent of workers employed through temporary agencies have no health insurance. Only 3 percent of agency temp workers with family incomes below $15,000 have employer-provided health insurance (31). People who have ever held part-time or temporary jobs continue to have a lower chance of receiving health benefits at subsequent jobs (114).

Welfare reform eliminated welfare recipients' right to medical insurance after defined time periods. Some former recipients continued to be entitled to medical insurance after obtaining employment but did not receive this information. The complexity of determining eligibility and recertifying families discourages both caseworkers and recipients from applying for Medicaid (51, 115, 116). Many caseworkers encourage former recipients to accept as few benefits as possible. Of 39 current or former recipients interviewed at Boston Medical Center in 1999, only one knew the date she was scheduled to lose benefits and most lacked other basic information (49).

PRWORA excluded most legally documented immigrants from Medicaid for their first five years in the United States. Immigrants may or may not become eligible for Medicaid subsequently, depending on state regulations. The law further deemed available to immigrants the income of U.S. citizens who sponsor them, keeping most legal residents permanently ineligible. In most states PRWORA technically applies only to immigrants admitted after 1996, and some states use their own funds to supply health services to immigrants no longer eligible for Medicaid. However, Medicaid use among potentially eligible legal immigrants declined after PRWORA, possibly due to a "chilling effect" on applying for benefits. In addition, for several years legally documented immigrants who used public health services risked being defined as a "public charge" and subsequently denied opportunities for legal permanent residence or naturalization, and in some cases deported. A 1999 federal rules clarification nullified this practice, but such legal changes are not typically well publicized to immigrant populations (55, 117, 118). California's Proposition 187, passed in 1994, also discouraged use of medical services by even severely ill immigrants, though the governor cancelled its implementation in 1999 (37, 55, 117).

Magnitude of the Change: For adults in families with two full-time workers, the percentage uninsured rose from 9.7 percent in 1994 to 11.2 percent in 1998 (119). By 1998, approximately 25 million workers were uninsured. For workers earning less than $7 per hour, rates of participation in job-based health insurance programs fell by 14 percent between 1987 and 1996. The proportion of these workers covered by any form of health insurance dropped from 54 to 42 percent. More than 40 percent of workers earning less than 200 percent of the poverty level were uninsured in 2000 (111, 120). Although most welfare-leavers obtain low-wage jobs with no insurance, those who find full-time work are least likely to retain Medicaid coverage. In 2000, 10 to 20 percent or more of these workers obtained public coverage, depending on the state (116). Limited studies found that more than half the women who left welfare did not obtain employer-provided health insurance, and nearly half had no health insurance a year or more later (51, 111, 115). Between one-third and one-half of 973 undocumented immigrants surveyed in four cities in 1996–1997 reported they were afraid they would not receive care because of their immigration status (121). By 2000, nearly 37 percent of low-income adult noncitizens reported having no usual source of medical care (56). In 1997, 41 percent of noncitizen immigrant adults reported no visits to a doctor, nurse, or emergency room in the previous year (117).

Increasing Obstacles to Diagnosing Work-Relatedness

Growth in New Technologies

Physicians typically rely on published information to associate patients' health problems with workplace exposures. Yet some of the fastest growing industries of the past 25 years—hazardous waste management and cleanup, biotechnology, and

electronics assembly—expose employees to hundreds of new compounds whose potential health effects remain understudied. These include organometals likely to accumulate in human tissue (38, 122).

Managed Care

Potential Effects on Occupational Health Data: Since the late 1980s, employees who do have private insurance or Medicaid are likely to be covered by managed care. Managed-care companies encourage clinicians to reduce costs by seeing more patients in less time, providing fewer services, and pleasing business clients. Overall effects of managed care on the quality of patient care and time per appointment have been debated (123), but some findings suggest that this system is associated with poorer physical health outcomes and dissatisfaction with patient-physician interactions for low-income patients (124).

Ample anecdotal evidence supports physicians' perceptions of insufficient time and resources to devote to patient care and diagnosis (experience of author, ML), and physicians cite lack of time as a main reason for inability to collect information on occupational exposures (125). The search for lower costs leads some employers to frequent shifts in plans, preventing workers from developing relationships with providers who understand their workplace problems and know them well enough to recognize the subtle changes and symptoms often associated with illness or chronic injury (112).

Cost capitation and administrative barriers discourage physicians from ordering tests or other procedures necessary for diagnosing occupational illness, and from referring patients to occupational medicine specialists better prepared to diagnose these problems. Managed care also involves direct corporate control over physician behavior, to the extent of sending case managers to accompany patients to case histories and physical exams (112, 126). Because some managed-care providers rely on contracts with employers for a large portion of their business, they may be discouraged from identifying occupational illnesses and injuries, filing compensation claims, recommending preventive workplace changes, or otherwise offending their clients (112).

Magnitude of the Change: Between 1987 and 1996, the percentage of employees in managed-care plans rose from 25 to 75 percent (124).

Workers' Compensation Reform

Potential Effects on Occupational Health Data: In the 1990s, most U.S. states passed major changes to workers' compensation laws that increased obstacles to coverage for medical care and lost wages, reduced benefits, and increased negative consequences for seeking compensation. These charges discourage physicians, workers, and attorneys from participating in the workers' compensation system (127).

Workers' compensation reform may be associated with significant changes in the sensitivity of data collection by compensation insurers and the BLS. Documented cases of occupational musculoskeletal disorders—on the rise since 1986 because of improved recognition—declined starting in 1994, shortly after the beginning of the trend to workers' compensation reform. Occupational skin diseases followed a similar pattern after 1996 (128). Documentation of these disorders, relative to traumatic injuries, is highly subject to reporting practices.

Changes in types of claims are consistent with trends toward shifting claims from more severe to less severe categories through stricter return-to-work policies, shorter time limits on benefits, and pressures on clinicians to classify injuries as less serious. Between 1993 and 1997, compensated claims in 37 states showed decreases of an estimated 36 percent in permanent total disabilities, 26 percent in permanent partial disabilities, 9 percent in temporary total disabilities, and 6 percent in medical-only claims (14), whereas light-duty cases increased by around 50 percent from 1992 to 1997 (1, 129). In 1981 the BLS documented about nine times more "lost time" cases with days away from work than those involving restricted work. Days-away-from-work cases fell from 1990 as restricted-work cases increased steadily from 1986 to 1997, when they surpassed days-away-from-work cases in manufacturing (128, 129).

Phenomena Underlying the Change: We consider here disincentives for physicians, workers, and lawyers, and other factors affecting workers' compensation claims.

Disincentives for Physicians

By 1995 more than a quarter of U.S. workers' compensation jurisdictions had instituted utilization or bill review, in some states allowing insurance companies to set their own utilization review criteria (130). Reviewers may be unqualified and their reductions or denial of claims arbitrary (131, 132). Utilization review can involve physicians in legal proceedings and courtroom testimony. Claims for disease or chronic injuries typically involve extensive paperwork; multiple tests, treatments, and referrals; justification of these services; and appeals when they are denied, often delaying payments for over a year (112, 133).

Decreases in fees also discouraged physicians from using workers' compensation in the early 1990s, before other types of insurance schedules declined. By 1995, 63 percent of U.S. workers' compensation jurisdictions had imposed medical fee schedules and 55 percent had regulated payment to hospitals (130). The Connecticut State Medical Society cited "the disastrous effects of fee schedules in other states where fees have been set too low and not properly updated" (131, p. 678).

Disincentives for Workers

By the 1990s, 41 percent of workers' compensation jurisdictions limited workers' initial choice of medical provider (130). Hurt workers in 38 states were

limited to doctors from a company-approved list, employer-appointed panel, or managed-care program controlled by the insurer (133, 134). Some states extended the period during which a worker must be treated by an employer-designated physician, and 80 percent of jurisdictions placed restrictions on change of provider (130, 132).

Insurers instituted more requirements for proving work-relatedness of injuries and illnesses. In some cases, a condition and its work-relatedness must be assessed by an independent medical examiner paid by the insurer. When medical findings are disputed, workers must petition for hearings before state workers' compensation judges, which can delay medical treatment for days to months. Doctors may provide only palliative treatment, even for serious injuries, until insurers agree to pay for tests, specialists, surgery, or more costly medication, and attorneys have accused insurers of increasingly stalling approval. The new regulations also have limited length and types of treatment for given conditions (127, 133–135).

Workers' compensation reform also increased barriers to partial wage replacement for lost work time. In Ohio, lawyers were involved in 45 percent of lost-wage cases as of 1997, so workers in those cases lost one-third of their benefits to legal fees. Ohio workers with permanent, partial disability automatically had to wait 40 weeks to receive benefits (136). Some states eliminated partial wage replacement for all but extremely severe or crippling injuries. Some changes exempted employers from liability for injured workers with preexisting conditions (127).

Workers who were granted partial wage replacement saw overall benefit levels decreased and cost-of-living adjustments eliminated. In California, 1997 wage-replacement benefits ranged to as low as $39 per week; in Georgia in 1999, as low as $32.50 (137, 138). In 2001, the maximum temporary weekly disability benefit in California was $490 (139). New York State capped the maximum weekly benefit at $400 from 1992 to 1998 (140). In some states, lost-wage calculations consider only the job where the worker was hurt, not other jobs that the person may have held but may be unable to perform because of the injury (141).

Many states also limited total time that workers could be compensated for lost wages, to as little as three weeks (127, 133). Employers were no longer required to file petitions before stopping benefits (132). Some laws allowed termination or suspension of benefits when a patient reached "maximal medical improvement," regardless of the person's subsequent ability to work or obtain comparable employment (127, 138). Workers faced obstacles to obtaining even the newly limited benefits. A 1997 California study found that insurers failed to properly notify workers of benefits in one of five cases. In one of six cases studied, the insurers did not pay workers all the money to which they were entitled (137).

Compensation reform increased pressures to return to work even when not medically advisable (142). Return to work replaced optimal treatment as the goal of compensation in many states (133). Some passed "return-to-work" legislation requiring employees to accept work offered and rewarding employers who

brought injured employees back to work quickly (129, 135). "Funded employment," a system started in Pennsylvania in 1992 then adopted in North Carolina, places severely disabled people in subsidized jobs and allows the state to eliminate their benefits if they are not able to perform (143).

Compensation reform intensified the social and psychological consequences of seeking compensation. A national media campaign in the early 1990s portrayed injured workers as lazy cheats. Many states required doctors to release medical records of workers involved in compensation claims. Employers increasingly demanded complete medical histories from job applicants who had ever filed claims (127, 130). In several states, employees who had an accident at work were automatically tested for drugs or alcohol, and in some cases refusal to take these tests disqualified the employee for compensation (138).

As a result of all these changes, many workers spend months to years in legal conflicts to obtain legally guaranteed benefits. The proportion of California workers' compensation cases that involved litigation doubled between 1985 and 1997, reaching one in five, and the cost of such cases more than tripled between 1986 and 1992. The consequences of delayed medical care and wage replacement can include job loss, financial ruin, and further decline in health (127, 137, 140). Immigrant workers with limited resources to engage in long court battles often lose years in the process, and in some cases must return to their home countries, disabled yet uncompensated (144). Injured workers are also less likely to file compensation claims after observing co-workers' experiences (experience of author, ML).

Disincentives for Lawyers

Fees for plaintiffs' attorneys were lowered in many states in the 1990s, increasing the difficulty of finding attorneys willing to represent injured workers (127, 137) and encouraging attorneys to accept inadequate settlements rather than prolong cases (134). In New York, insurers started to appeal more decisions by workers' compensation judges to the Workers' Compensation Board (WCB) after Governor George Pataki appointed all 13 commissioners (145). The Commissioners often reverse findings of work-relatedness. Attorneys began to avoid certain cases rather than spend considerable time on a case likely to be appealed and denied by the commissioners (experience of author, ML).

Other Means of Avoiding the Workers' Compensation System

During this period, employers also developed nonlegislated methods to avoid the workers' compensation system. More contracted with first-aid providers, preventing the need to record certain injuries in OSHA logs or file medical care claims for workers' compensation (14). Over-the-counter steroid preparations were increasingly used at the worksite to treat occupational dermatitis, avoiding the need for medical care. Providing hurt workers with "light duty" rather than time away from work reduced liability for wage compensation (128).

Employers more commonly invited physicians to the workplace, introduced them to managers and onsite medical personnel, and provided plant tours and product samples, to impress them with their commitment to the health of employees. These experiences encourage physicians to request and believe information from their company contacts regarding subsequent worker injuries—for example, assertions that an exposure was trivial and could not conceivably have caused a worker's health problem, or that a back injury actually happened at home after a few drinks. Employers began to steer workers to these physicians: "We know a good doctor who can help you with this," or "This is the doctor we pay for" (experience of author, ML).

Even if the company-chosen physician makes a work-related diagnosis, the company may pay the physician directly, with neither the physician nor the company reporting to workers' compensation. Workers sometimes believe they have a workers' compensation claim because their employer is covering their medical bills and time off, but learn later that the WCB has no record of their case (experience of author, ML).

CONCLUSIONS

Accurate information on work-related injuries and illnesses is a crucial component of public health. Surveillance data permit the development of basic knowledge on the etiology of occupational illnesses, the identification of industries and occupations with greatest needs for preventive interventions, and the evaluation of approaches to protecting workers' lives and health (146, 147). Systems responsible for promoting safe and healthy workplaces may be hobbled by spurious data suggesting overall progress in working conditions.

Aspects of the U.S. work environment did improve in the 1980s and 1990s. Some employers and unions gave increased attention to health and safety, introducing safer equipment, ergonomic design, enhanced personal protection, toxics use, reduction, and education. New regulations took effect, including the bloodborne pathogens standard. Reported rates of traumatic occupational fatalities, less affected by reporting artifacts, fell by 47 percent between 1980 and 1998, dropping sharply even in hazardous industries (10, 148).

Nonetheless, we have shown that political and economic transformations of the past decades have likely heightened barriers to documentation of work-related injuries and illnesses, particularly for populations most at risk of injury. Other observers have independently proposed similar influences on reporting (149). Currently available data do not permit straightforward testing of these hypotheses. A challenge for researchers will be to disentangle bona fide improvements in safety from increased underreporting. Doing so will require innovative research drawing on multiple disciplines and novel sources of information.

Approaches can include empirical research comparing documented illnesses and injuries with primary data gathered from workers, clinicians, or others closer

to the event than an OSHA Log or a workers' compensation claim, such as the community-based surveys used in recent studies of immigrant workers (150, 151). In-depth case studies might profitably examine trends in particular areas, industries, or workplaces. Although establishing causality will be difficult, changes can be described in the context of broader developments such as those presented in this article. Apparent correlations can be investigated through such qualitative methods as in-depth interviews with affected workers and with gatekeepers of health records, including plant supervisors, clinicians, or insurance adjusters.

Quantitative modeling of trends will require a combination of currently available data and data gathered for this purpose. For example, the BLS reports that injury and illness rates in durable goods manufacturing fell 30 to 34 percent between 1996 and 2001 in Alabama, Arkansas, Delaware, Louisiana, and Minnesota, but during the same period fell less than 10 percent in Iowa and Kansas and actually rose in Hawaii and Vermont (152). Investigation of such changes for each state and territory could test independent variables, including unemployment rates and changes, wage rates and changes, plant closings, job creation, union density and changes, prevalence of contingent and temporary work, availability of standard employment, rates of entrance of welfare-leavers to the workforce, documented levels of immigration, various aspects of workers' compensation reform, prevalence of medical insurance coverage, deportations and arrests of immigrant workers, prevalence of physician participation in the workers' compensation system, and many more. A thorough approach will involve collecting data on these factors as well as obtaining access to existing data; for example, little is known about physician participation in compensation or reporting programs, or the prevalence of safety incentive programs that reward nonreporting of injuries. Additional factors may be related to other broad phenomena not discussed in this article for reasons of space, including changes in OSHA policies of targeting for enforcement firms that report high injury rates (129) and falling numbers of OSHA inspections (8).

One highly variable quantitative outcome that merits study is the divergence between reported fatality rates and reported illness and injury rates. Rapid divergence for a given study population, such as an industry, occupation, region, or demographic group, might suggest changes in injury-reporting practices. The identification of factors associated with growing differences between these rates could aid in understanding obstacles to surveillance, especially in the industries and populations where fatality rates actually climbed during the era under discussion (153, 154).

The need to better understand these issues has become more urgent with the intensification of trends described in this article. Since 2000, unemployment has increased and levels of means-tested assistance have continued to decline. The September 11, 2001, attacks on the World Trade Center and the Pentagon led to more resentment and violence directed against immigrants and ethnic minorities, restrictions on immigrants, and intensified INS activities (27, 155). Social Security

no-match letters sent to employers in early 2002 caused up to 100,000 workers, mostly immigrants, to lose their jobs (156). These developments can only magnify the phenomena we have discussed here.

A prominent 2002 legal case, *Hoffman Plastic v. National Labor Relations Board,* eliminated the legal right of undocumented workers to back-pay when they are fired for union organizing. This provided an incentive for employers to claim that workers who are not citizens do not enjoy rights to back-pay, minimum wages, and overtime pay (99). William B. Gould IV, former NLRB chairman, predicted that *Hoffman* "will bring into our borders more exploitable low wage workers" (157).

At the very least, responsible researchers should not uncritically accept reported changes in occupational injury and illness rates. Addressing this issue is crucial to prioritizing public health problems and targeting interventions. If injury and illness rates are truly falling as claimed, then current practices in occupational safety and health are justified, and our main task is to maintain the status quo. If, as we argue, this is not the case, we need to press for attention to workplace hazards now obscured by encouraging statistics.

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