

Methodological Appendix

In this issue brief, we pool estimates of worker turnover costs from 31 case studies included in 13 research articles (selected from 37 case studies in 14 research articles). The studies included in our estimates meet the following criteria:

- They assign a dollar value to the cost of worker turnover for a specific position.
- They include information on how the estimations were calculated.
- Wage or salary data for that position are available.
- They were published between 2000 and 2020.

This research follows previous work by Heather Boushey and Sarah Jane Glynn (“[There Are Significant Business Costs to Replacing Employees](#),” an issue brief published in 2012 by the Center for American Progress), as well as data analysis by Heather Boushey and Tanya Doriss when they were staff at the congressional Joint Economic Committee.

Estimates in this issue brief, however, were calculated using different data sources and incorporating another set of studies. See Table 1 for a summary of the studies included in this issue brief.

Most studies calculate the cost of employee replacement, but they do not include the salary for that position. In those cases, we assigned an annual mean wage using the National Occupational Employment and Wage estimates from the U.S. Bureau of Labor Statistics’ [Occupational Employment Statistics](#). See Table 2 below for the matches between the job category as described in the study and the occupations as described by the Occupational Employment and Wage estimates.

The Occupational Employment and Wage estimates calculate annual mean wages by multiplying the hourly mean wage by year-round, full-time-equivalent hours (2,080 hours). For some positions that do not tend to work year round, full time, the Occupational Employment Statistics reports hourly wages or annual salaries depending on how they are typically paid. If annual wage data for a given occupation are not available for the year in which the turnover cost was estimated, then the cost is adjusted to the closest year for which data are available. The survey has been modified throughout the years to provide information on more detailed occupational categories. If information on the average annual wage is not available in the study or in the Occupational Employment and Wage estimates, it is excluded from our main analysis.

TABLE 1

Study	Summary of the study	Job category as described in the study	Cost cited in the study	Annual average wage in the year the cost was estimated	Turnover cost as a percent of the annual average wage	Current average wage (2019)
Blake Frank, “ New Ideas for Retaining Store-Level Employees ” (Coca-Cola Company Retailing Research Council, 2000). ¹	The study analyzes the cost of worker turnover in the U.S. supermarket industry. It uses survey data from 2000, drawing personnel information for more than 170,000 workers in 18 establishments and 10 different companies. The study reports turnover costs for union and nonunion workers, as well as the direct and opportunity costs, such as losing customers because of a decline in the quality of service.	Store manager	\$34,735	\$74,230	46.8 percent	\$141,690
		Department manager	\$7,045 to \$9,964	\$32,170	21.9 percent to 31 percent	\$45,830
		Cashier	\$2,286 to \$4,313	\$15,730	14.5 percent to 27.4 percent	\$24,370
		Other hourly personnel	\$3,372 to \$4,291	\$20,260	16.6 percent to 21.2 percent	\$29,360
Timothy R. Hinkin and J. Bruce Tracey, “ The Cost of Turnover: Putting a Price on the Learning Curve ,” <i>Cornell Hospitality Quarterly</i> 41 (3) (2000): 14–21.	The study estimates the cost of turnover in hotels in Miami and New York City. To determine turnover costs, the authors include the following broad categories: separation costs, recruiting and attracting costs, selection costs, hiring costs, and lost-productivity costs. For their estimates, the authors create and calibrate an algorithm through interviews with human resources staff and on-site interviews.	Front-office associate	\$5,688 to \$5,965	\$20,780	27.4 percent to 28.7 percent	\$31,250
		Loss-prevention (security) associate	\$3,026	\$19,470	15.5 percent	\$33,030
		Line cook	\$2,077	\$18,880	11 percent	\$28,700
		Administration, sales, catering	\$7,658	\$32,520	23.5 percent	\$43,410
		Gift-shop clerk	\$3,383	\$17,100	19.8 percent	\$25,950
		Room-service wait staff	\$1,332	N/A	N/A	N/A
Michelle I. Graef and Erik L. Hill, “ Costing Child Protective Services Staff Turnover ,” <i>Welfare</i> 79 (5) (2000): 517–533.	The study estimates the cost of turnover for workers in a child welfare agency in a midwestern state in 1995. The authors calculate the cost of separation, replacement, and training for incoming staff.	Child protective services worker	\$10,000	\$29,017.14 ²	34.5 percent	\$51,030

<p>Frank Kelly and others, “The Shocking Cost of Turnover in Health Care,” Health Care Management Review 29 (1) (2004): 2–7.</p>	<p>The study uses accounting records data from an academic medical center in the Southwest. It reflects conservative estimates of the cost of turnover, since overtime pay, productivity declines, administrative overhead, and training materials—costs not observable in accounting data—are excluded from the calculations. The estimates were calculated for 2001.³</p>	Physicians	\$126,543	\$130,105 ⁴	97.3 percent	\$203,450
		Registered nurses	\$17,460	\$48,240	36.2 percent	\$77,460
		Allied health personnel	\$2,307	N/A	N/A	N/A
		Technical staff	\$1,934	\$36,630 ⁵	5.3 percent	\$47,540
		Support	\$2,533	\$21,902 ⁶	11.6 percent	\$31,010
		Administrative assistants or managers	\$3,926	\$25,370	15.4 percent	\$46,590
<p>Robert C. Atchley and Jane Karnes Straker, “Recruiting and Retaining Frontline Workers in Long-Term Care: Usual Organizational Practices in Ohio,” (Oxford, Ohio: Miami University, 1999).</p>	<p>The study estimates turnover costs by conducting more than 100 interviews with administrators for nursing homes and home health agencies in Ohio. The authors find that most establishments greatly underestimate the extent and cost of worker turnover.</p>	Nursing home workers	\$1,685 to \$2,100 ⁷	\$17,860	9.4 percent to 11.8 percent	\$30,790
		Home health agency workers	\$952 to \$1,242	\$18,810	5.1 percent to 6.6 percent	\$26,440
<p>Steve Seninger and Meg A. Traci, “Direct Service Staff Turnover in Supported Living Arrangements: Preliminary Results and Observations” (Missoula, MT: Rural Institute of the University of Montana, 2002).</p>	<p>The study estimates turnover costs for community providers of supported living services. In 2002, the authors interviewed seven private service corporations in Montana and calculated the cost of recruiting, screening, and training incoming workers.</p>	Direct service workers for individuals with developmental disabilities*	\$2,627	\$21,674 to \$15,725 ⁸	12.1 percent to 16.7 percent	\$30,808 to \$22,352
<p>Gary Barnes, Edward Crowe, and Benjamin Schaefer, “The Cost of Teacher Turnover in Five School Districts: A Pilot Study,” (Washington: National Commission on Teaching and America’s Future, 2007).</p>	<p>The study estimates the cost of teacher turnover in five school districts, collecting data during the 2002–2003 and 2003–2004 school years. The districts in the study include the Chicago, Milwaukee, Granville, Jemez Valley, and the Santa Rosa Public Schools.</p>	School teacher	\$4,366 to \$17,872	\$45,323 ⁹	9.6 percent to 39.43 percent	\$64,470

<p>Eileen Appelbaum and Ruth Milkman, “Achieving a Workable Balance: New Jersey Employers’ Experiences Managing Employee Leaves and Turnover” (New Brunswick, NJ: Center for Women and Work, 2006).</p>	<p>The study estimates turnover costs of various positions in 2005 in New Jersey. When estimating the costs, the authors consider loss of productivity due to learning period, real estate and moving costs, staff time spent screening, interviewing new candidates, and advertisement of the open position, although these considerations vary somewhat with each position.</p>	Heavy manufacturing plant employee*	\$760	\$18,720 ¹⁰	4.1 percent	\$24,511 ¹¹
		Registered nurse	\$1,200	\$56,880	2.1 percent	\$77,460
		Financial professional*	\$8,500 to \$13,000	\$70,000	12.1 percent to 18.6 percent	\$91,655
		Senior manager at a residential construction company*	\$80,000 to \$90,000	N/A	N/A	N/A
		Middle manager at a consumer products company*	\$98,000 to \$117,000	\$87,500	112 percent to 133.7 percent	\$114,569
		Lower-level executive at a consumer products company*	\$185,000	\$125,000	148 percent	\$163,669
		Senior-level executive at a consumer products company*	\$260,000	\$200,000	130 percent	\$261,871
<p>Cheryl Bland Jones, “Revisiting nurse turnover costs: adjusting for inflation.” The Journal of Nursing Administration 38 (1) (2008): 11–8.</p>	<p>Building on earlier work and using baseline estimates from the turnover cost of registered nurses in a large, acute-care hospital in 2002, the author takes advantage of changes in the CPI and reports updated estimates on the cost of turnover.</p>	Registered nurse	\$82,000 to \$88,000	\$62,480	131.2 percent to 140.8 percent	\$77,460
<p>Jessica L. Friedman and Dana Neutze, “The Financial Cost of Medical Assistant Turnover in an Academic Family Medicine Center.” The Journal of the American Board of Family Medicine 33 (3) (2020): 426–430.</p>	<p>The authors estimate the turnover rate and cost for medical assistants in a large family care clinic. They collect data from the University of North Carolina Family Medicine Center, and adapt the Nursing Turnover Cost Calculation Methodology to account for both direct and indirect costs of turnover.</p>	Medical assistant	\$14,200	\$33,580	42.3 percent	\$35,720

<p>Abigail Jurist Levy and others, “Estimating Teacher Turnover Costs: A Case Study,” <i>Journal of Education Finance</i> 38, (2) (2012): 102–129.</p>	<p>The authors analyze the turnover cost for middle and high school teachers in Boston public schools, estimating the different costs for science and non-science teachers. They use an “ingredients method” for their analysis, which includes five categories: separations, recruitment and hiring, new teacher support, ongoing professional development, and the salary gap between exiting and incoming teachers.</p>	<p>Science school-teachers*</p>	\$39,170	\$56,990 ¹²	68.7 percent	\$64,740
		<p>All other school-teachers*</p>	\$19,460	\$56,990	34.1 percent	\$64,740
<p>Kristine Kiernan, “Calculating the Cost of Pilot Turnover,” <i>Journal of Aviation/Aerospace Education & Research</i>, 27 (1) (2018): 49–69.</p>	<p>The author estimates the turnover cost for Part 135 carrier pilots, creating a generalizable model for airlines to determine their turnover costs. While there are no estimates on the overall turnover rate in the industry, available evidence suggests it is relatively high due to stress, long hours, and relatively low pay.</p>	<p>Part 135 carrier pilot*</p>	\$17,405	\$40,000	43.5 percent	\$41,691
<p>Iowa Department of Public Health, “Cost of turnover in the direct care workforce” (2014).</p>	<p>Iowa’s Department of Public Health updated previous estimates on the costs incurred by employers each time a direct care worker leaves a position. The department finds a relatively high turnover rate in this occupation (64 percent) and a combination of low wages, lack of access to fringe benefits, and a high degree of employer-specific training. The expenses include separation, vacancy, recruiting, and training costs for the new hire.</p>	<p>Direct care workers*</p>	\$4,026	\$25,818.41 ¹³	15.6 percent	\$29,598 ¹⁴

Arindrajit Dube, Eric Freeman, and Michael Reich, “Employee Replacement Costs.” Working Paper No. 201-10 (Institute for Research on Labor and Employment, 2010). The authors use panel survey data of California businesses between 2003 and 2008, and find that replacement costs represent a relatively high share of annual wages. They also find some evidence that replacement costs have a positive relationship with the size of the establishment. ¹⁵	Professional and managerial workers	\$7,558	\$45,448	16.6 percent	N/A
	Blue-collar workers	\$2,341	\$31,262	7.5 percent	N/A
	Overall average	\$4,529	\$36,920	12.3 percent	N/A

TABLE 2

Job category as described in the study	Assigned OES occupation for the annual average wage in the year the cost was estimated
Store manager (supermarket)	Sales manager
Department manager (supermarket)	First-line supervisor/manager of retail sales workers
Cashier (supermarket)	Cashier
Other hourly personnel (supermarket)	Retail salesperson
Front-office associate (hotel)	Receptionist and information clerk
Loss-prevention (security) associate	Security guard
Line cook (hotel)	Cook, restaurant
Administration, sales, catering (hotel)	Executive secretary and administrative assistant
Gift-shop clerk (hotel)	Hotel, motel, and resort desk clerk
Child protective services	Child, family, and school social worker
Nursing home worker	Nursing aide, orderly, and attendant
Home health agency worker	Home health aide
School teacher	- Elementary school teacher, except special education - Middle school teacher, except special and vocational education - Secondary school teacher, except special and vocational education
Registered nurse	Registered nurse
Medical assistant	Medical assistant
Physician	Physician and surgeon, all other
Technical staff (medical center)	- Medical and clinical laboratory technician - Medical and clinical laboratory technologist

Support (medical center)	Healthcare support
Administrative assistant or manager (medical center)	Medical records and health information technician

Endnotes for the Methodological Appendix

- 1* Annual average wage or salary available in the study. The costs estimated in this study include the direct, opportunity, and total costs (direct + opportunity) of employee turnover. The estimates included in this table reflect total costs. The ranges reflect the cost difference of replacing a union and nonunion worker.
- 2 Annual wage adjusted from 1999 dollars (when estimates for “child, family, and school social workers” first became available) to 1995 dollars (the year for which the turnover cost was calculated) using the Consumer Price Index.
- 3 Employee turnover costs calculated as the per-person cost to hire, plus the cost to train.
- 4 Annual wage adjusted from 2004 dollars (when estimates for “physicians and surgeons, all other” first became available) to 2001 dollars (the year for which the turnover cost was calculated) using the Consumer Price Index.
- 5 Calculated averaging the annual wage of medical and clinical laboratory technicians and medical and clinical laboratory technologists from the Occupational Employment and Wage estimates.
- 6 Calculated multiplying the average hourly wage for all healthcare support occupations (\$10.53) by full-time, year-round hours (2,080).
- 7 Ranges reflect costs in nursing homes and home health agencies with low and high turnover rates.
- 8 Calculated multiplying the average hourly wage for all healthcare support occupations (\$7.56 to \$10.42) by full-time-equivalent, year-round hours (2,080). The range represents wages for direct service staff categorized as “low end” and “high end.”
- 9 Calculated averaging the annual wage of elementary, middle, and secondary school teachers from the Occupational Employment and Wage estimates (2003).
- 10 Calculated multiplying the entry wage (\$9) by full-time, year-round hours (2,080).
- 11 But for registered nurses, all current (2019) wages in Eileen Appelbaum and Ruth Milkman, “Achieving a Workable Balance: New Jersey Employers’ Experiences Managing Employee Leaves and Turnover” are estimated by adjusting the 2005 annual wages to 2019 dollars.
- 12 Calculated as the average annual salary for exiting teachers (\$64,216) and incoming teachers (\$49,764) cited in the study.
- 13 Calculated multiplying the average hourly wage in 2010 (\$11.68) by full-time, year-round hours (2,080) and adjusted to 2013 dollars. Average hourly wages for Iowa direct care workers were taken from Child & Family Policy Center, “[Iowa Direct Care Worker Wage and Benefit Report](#)” (2010).
- 14 Calculated multiplying the average hourly wage in 2019 (\$14.23) by full-time, year-round hours (2,080). Average hourly wages for Iowa direct care workers were taken from Iowa Caregivers and Iowa Workforce Development, “[Direct Care Workers of Iowa 2019 Wage and Benefit Survey](#)” (2019).
- 15 Annual average earnings from the [National Compensation Survey](#) and calculated multiplying the hourly average earnings of blue-collar workers (\$15.03), white-collar workers (\$21.85), and all workers (\$17.75) in 2003, by full-time, year-round hours (2,080). Because the National Compensation Survey reports earnings that include incentive pay, cost-of-living adjustments, and hazard pay, these turnover costs are not included in the main analysis.