

TRENDS

Better Late Than Never: Workforce Supply Implications Of Later Entry Into Nursing

Policymakers focused on workforce planning can draw some measure of encouragement from this updated forecast.

by David I. Auerbach, Peter I. Buerhaus, and Douglas O. Staiger

ABSTRACT: Although the number of people entering nursing in their early to mid-twenties remains at its lowest point in forty years, large numbers of people are entering the profession in their late twenties and early thirties. And although it remains unclear why people are becoming nurses later, there is evidence that nursing is attracting interest from different segments of the potential workforce than it was in the 1970s and 1980s. We analyze these trends using data through 2005 and a revised forecast model that still predicts a nurse shortage by 2020, but a smaller one than previously forecast. [*Health Affairs* 26, no. 1 (2007): 178–185; 10.1377/hlthaff.26.1.178]

THE SIZE AND IMPACT of the current U.S. shortage of registered nurses (RNs) is well documented. It began in 1998; was estimated to have resulted in 126,000 unfilled hospital positions in 2001; and in 2006 entered its ninth year, making it the longest shortage in the past fifty years.¹

In this paper we report the results of our analysis of nurse workforce data through 2005—the most recent available. We find that declining interest in the nursing profession reported elsewhere might have been a temporary lull and confined primarily to younger people choosing their first career.² Although the number of people entering nursing in their early to mid-twenties remains at its lowest point in forty years, many are entering the profession in their late twenties and early thirties. In fact, af-

ter lagging behind prior cohorts with respect to propensity to become RNs at younger ages, cohorts born in the 1970s are now approaching the levels of participation attained by the large baby-boom cohorts of the 1950s. What we observe, therefore, can be broken into two separate trends: later age of first entry into the profession, and an increased overall interest in nursing among recent cohorts.

In addition to analyzing these trends, we forecast the future age and supply of RN full-time-equivalents (FTEs), using a forecasting model developed several years ago that was the basis for some of the first projections of the coming nurse shortage. These new forecasts suggest that our prior projections of the supply of RNs in 2020 were too pessimistic.

■ **Our 2000 study.** In 2000 we projected

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the future age and supply of RN FTEs in the United States between 2000 and 2020, using data through 1998.³ We reported declining interest in nursing among cohorts born in the 1960s and 1970s. Our projections indicated that the average age of working RNs would increase from 42.0 years in 2000 to 45.4 years in 2010 (when fully 40 percent of the RN workforce would be over age fifty) and would hold steady at this level over the next decade. Our forecasts also indicated that the number of RN FTEs would grow slowly until 2012, peaking at 2.2 million and subsequently declining to 2.05 million FTEs by 2020, roughly the size of the RN workforce that existed in 2000.

■ **Comparison with HRSA studies.** The latest projections of the future demand for RNs at the time were reported in 1996 by the Health Resources and Services Administration (HRSA).⁴ Comparing our supply projections to HRSA's demand projections revealed a shortage of RNs developing over the twenty-year forecast period, growing eventually to more than 400,000 by 2020.

In 2002, HRSA published new RN workforce projections. These revised forecasts indicated that the demand for RNs would be 20 percent greater than its previous forecast, reaching 2.8 million RNs by 2020. Applying our projections of the future supply of RNs to HRSA's latest demand estimates, we estimated that the future shortage would double in size, reaching roughly 800,000 by 2020. If a shortage of this magnitude were to develop, the shortage in 2020 would be approximately seven times larger than the current shortage.⁵

■ **Need for a fresh look.** At the time we published our RN age and supply forecasts in 2000, the cohorts born in the 1970s were primarily in their early twenties, and the slow rates at which they were becoming RNs were interpreted as a continuing decline in the propensity to become a nurse, leading to pessimistic labor supply forecasts. Although we observed what appeared to be a trend toward later entry into nursing, we did not have strong corroborating evidence of its impact and thus did not incorporate this trend in our forecasting model. In subsequent studies, we

observed substantial growth in RN employment.⁶ This growth—roughly 300,000 from 2000 to 2005—was larger than either we or HRSA had projected and suggested the need for a fresh examination of the assumptions underpinning our forecasting model.⁷

Study Data And Methods

■ **Data.** As in our earlier forecasts, we relied on data from the Current Population Survey (CPS) from 1973 to 2005 (using the annual May surveys for 1973–1978 and the Outgoing Rotation Group Annual Merged Files for 1979–2005).⁸ The CPS is a household-based, nationally representative survey of more than 100,000 people administered monthly by the Bureau of the Census. It contains information on demographics, earnings, hours worked, industry sector, and employment of more than 3,000 RNs employed in nursing each year.

The data we analyzed included all people ages 23–64 who reported their occupation as an RN between January 1973 and December 2005 ($N = 86,568$). RNs who reported working fewer than thirty hours in a typical week were assigned 0.5 FTE.⁹ Those who were outside this age range, who together constitute less than 3 percent of the RN workforce, were excluded because their numbers in the workforce are too small to estimate accurate effects. All supply forecasts were adjusted to account for this exclusion.¹⁰ To make estimates representative of the U.S. noninstitutionalized population, observations were weighted by sampling weights provided by the CPS.¹¹

■ **Statistical model.** Briefly, we used a simple statistical model, commonly used by demographers and economists, to decompose observed changes in the number and age of RNs over time into the product of three components: population, cohort, and age effects.¹² The population component is based on census estimates of the number of people at each age in each year and captures the changing size of the U.S. population at each age over time. The cohort effect is the proportion of the population in each birth cohort (for example, the cohort born in 1955) working as RNs at a given age. This effect captures the propensities of

groups born in different years to choose a career in nursing over other professions. The age effect is the number of FTEs a given cohort will provide at each age. These age effects capture changes over the life cycle for a given cohort, such as a decline in FTEs as the cohort approaches retirement age.

Our original model made two key assumptions in forecasting RN FTEs to the year 2020: (1) Future cohorts that have not yet been observed will enter nursing at the rate of the five most recently observed cohorts, on average; and (2) future cohorts will follow the same life-cycle pattern of RN FTE production as they age (age effects) as has been observed for all previous cohorts.

To incorporate the recent trend toward later entry into nursing, we updated this model by relaxing the second assumption. Specifically, we allowed for a different life-cycle pattern of FTE production, prior to age thirty, for cohorts born after 1965.¹³ A new pattern was not forced—if the raw data indicate that recent cohorts have the same age pattern of FTE production as earlier cohorts, this new model would yield forecasts similar to those in our original model.

Study Findings

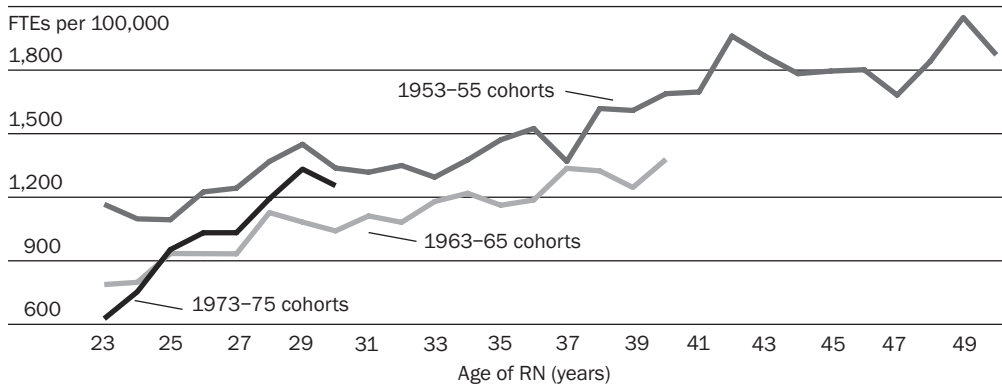
■ **Resurgence of 1970s cohorts in their thirties.** The increased RN participation in the

workforce among 1970s cohorts is captured by showing the rate at which those born in different time periods became nurses as they aged (Exhibit 1). For example, among those born in the mid-1950s, by age twenty-three, roughly 1,200 per 100,000 U.S. residents (1.2 percent) were RNs (FTEs). Participation in the nurse labor force grew gradually among these cohorts throughout their thirties and forties, leveling off at around 2,000 FTEs per 100,000 by age fifty. In contrast, among those born ten years later (1963–1965), participation was roughly 20 percent lower at every age. This drop reflects fewer people choosing nursing primarily because of the growth of other professions that were attracting women graduating from high school in the 1980s.¹⁴

A different pattern has emerged among the most recently observed cohorts. For those born in the mid-1970s, few had become RNs by their early twenties—fewer than their predecessors born in the 1960s. But over the next seven years, those born in the mid-1970s entered nursing at an unprecedented rate of increase, so that by age twenty-nine, there were nearly as many RN FTEs among this cohort (controlling for cohort population size) as there were among the cohorts born in 1953–1955, which produced the largest number of RNs in the U.S. workforce ever (Exhibit 1).

This recent shift from low RN participation

EXHIBIT 1
Registered Nurse (RN) Full-Time-Equivalents (FTEs) Per 100,000 U.S. Residents, In Three Three-Year Birth Cohorts, By Age



SOURCE: Authors' calculations based on data from the U.S. Current Population Survey, 1973–2005.

in the early twenties to high relative participation in the late twenties and early thirties among cohorts is revealed in greater detail in Exhibit 2. The two age-cohort lines track fairly well for those born before roughly 1965 and then diverge. That is, in earlier years, the number of RN FTEs observed for a given cohort in their late twenties was roughly 20 percent greater than had been observed for that cohort in their early twenties. For cohorts born after 1965, the number of RN FTEs at ages 29–30 is approaching double the number observed for the same cohorts at ages 23–24. Not accounting for this trend, the model would, for example, observe the 600 FTE RNs per 100,000 population produced by the 1975 cohort at age twenty-three (in 1998) and assume that this would forever be a small RN cohort, amounting to perhaps 800 RN FTEs by age thirty, instead of the 1,200 that were actually observed.

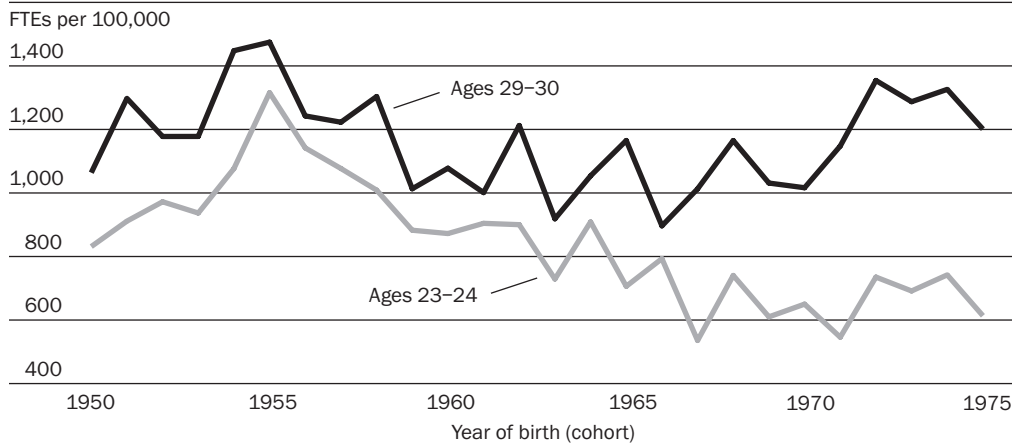
The importance of this change in forecasting future workforce participation is shown in Exhibit 3, which compares our earlier and revised models in their accuracy to forecast the observed workforce in 2004 and 2005 (averaged together for smoothness) using data only through 1998. Our earlier model underpredicted RN FTEs in their early thirties in 2004

and 2005. On the other hand, the revised model, which allows for a different pattern of FTE production for cohorts born after 1964 (ages 23–29), correctly predicts the observed rise in FTEs among 1970s-born RNs in their late twenties and early thirties.

■ **Age and supply forecasts.** Using this revised model, we forecast the age and number of FTE RNs to the year 2020 (Exhibit 4). In 2005 the average age of the FTE RN workforce is 43.5, and the largest age group comprises RNs in their forties. These RNs reflect the large number of people born in the baby-boom generation who entered nursing in the 1970s and 1980s. By 2012, the average age of the FTE RN workforce will have increased 1.2 years to 44.7 years, and RNs in their fifties will be the largest age group. We project the average age to peak at 44.9 in 2016 and by 2020 to have dropped back to 44.7. By then, many baby-boomer nurses will continue working in their sixties (outnumbering RNs in their twenties), but most will have retired.

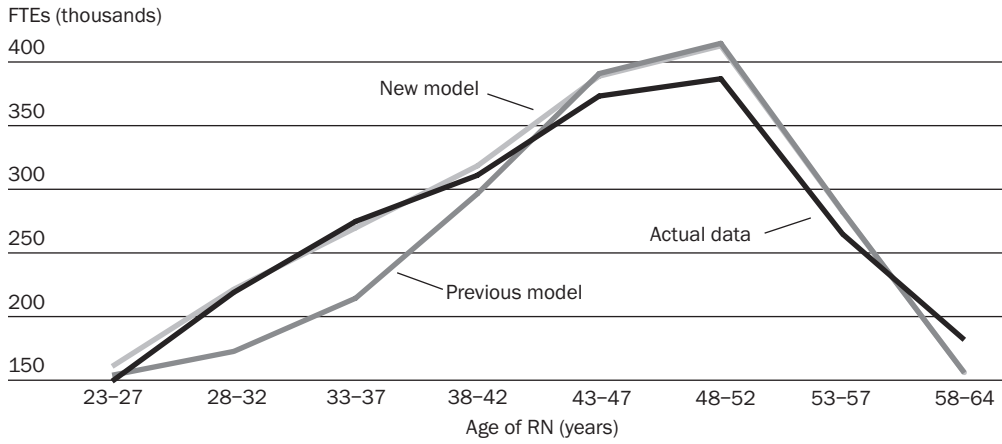
Using our revised projection model, the number of FTE RNs in 2020 is projected to be 420,000 greater than our previous forecast (Exhibit 5). Nearly one-fifth (80,000) of this increase is attributed to using more recent census data that indicate higher projected

EXHIBIT 2 Registered Nurse (RN) Full-Time-Equivalents (FTEs) Per 100,000 U.S. Residents, At Ages 23–24 Versus Ages 29–30, Birth Cohorts 1950–1975



SOURCE: Authors' calculations based on data from the U.S. Current Population Survey, 1973–2005.

EXHIBIT 3
Earlier And Revised Projections Compared With The Actual Number Of Registered Nurse (RN) Full-Time-Equivalents (FTEs) In 2004-05, By Age Group



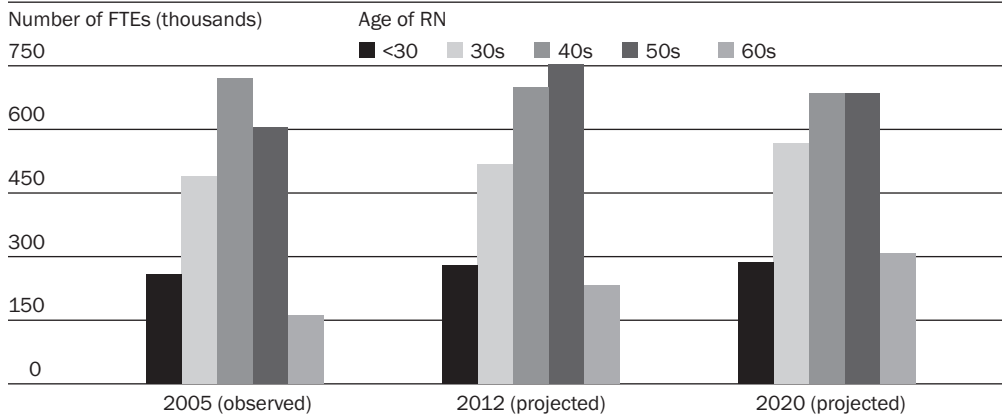
SOURCE: Authors' calculations based on data from the U.S. Current Population Survey, 1973-2005.
NOTE: For details on projection models, see text.

populations of working-age Americans over the next few decades. The majority (340,000) of the increase relative to our earlier forecasts is attributable to the fact that the revised model is better able to evaluate the true RN-producing potential of recent cohorts, which is greater than we had previously estimated.

Exhibit 5 also shows the effect of different assumptions about the size of future cohorts

of RNs not yet observed in our data (that is, those born after 1982). If such cohorts are as large as the record 1955 cohort (17 percent larger than the default model assumption—that is, the average of the most recent five cohorts), the RN workforce would still experience a shortfall of 220,000 RN FTEs. If future cohorts are 17 percent smaller than the most recent cohorts (for example, similar to the

EXHIBIT 4
Projected Age Composition Of Registered Nurse (RN) Full-Time-Equivalents (FTEs) In The United States, By Age Group, 2005, 2012, And 2020



SOURCE: Authors' calculations based on data from the U.S. Current Population Survey, 1973-2005.
NOTE: Average age in 2005, 43.5 years; in 2012, 44.7 years; and in 2020, 44.7 years.

EXHIBIT 5 Forecasts Of The U.S. Registered Nurse (RN) Full-Time-Equivalent (FTE) Workforce Through 2020

	Total RN workforce size in 2012 (millions)	Total RN workforce size in 2020 (millions)	Deficit in 2020 relative to latest HRSA projected requirements
Original forecast (Buerhaus et al., 2000) ^a	2.20	2.05	760,000
Updated population projections	2.25	2.13	680,000
Updated forecast model with new RN data (1999–2005)	2.45	2.47	340,000
Updated forecast model: all future cohorts 17% larger	2.49	2.59	220,000
Updated forecast model: all future cohorts 17% smaller	2.40	2.36	450,000

SOURCE: Authors' calculations based on data from the U.S. Current Population Survey, 1973–2005.

NOTE: HRSA is Health Resources and Services Administration.

^aSee Note 3 in text.

1963 cohort), the shortfall would be 450,000.

Overall, the revised projections suggest that the workforce will peak at roughly 2.5 million RNs in 2016, compared with our earlier forecast peak of 2.2 million in 2012. The workforce is projected to decline slightly after 2016 because newly entering cohorts are not expected to produce as many FTEs as the 1950s cohorts retiring in those years.¹⁵ Still, the ensuing decline in the number of RNs in the workforce is expected to be more gradual than our earlier forecast, leaving a projected shortfall relative to the latest estimates of demand projected by HRSA of 340,000 by 2020, compared with earlier forecast shortages of 760,000 RNs.

Discussion And Policy Implications

The observed workforce participation of RNs born in the 1970s is striking. Not only are they entering the workforce later than previous cohorts, but they are entering in greater numbers than the 1960s cohorts. RNs today are less likely to obtain their basic nursing education immediately after high school, as was more common in the past. Instead, two routes of entry into nursing have become increasingly common. First, people are entering the nursing profession by graduating from two-year associate degree programs after a substantial period in their early twenties spent in other careers or not in the workforce entirely. Second, people have increasingly entered nursing via

“accelerated” (12–18 months) bachelor-of-science degree programs designed for those with other (and usually unrelated) bachelor's degrees.¹⁶ With its relatively attractive entry wage, high job security, and relatively small educational investment, nursing has become an attractive career option for people in their twenties or early thirties who might have begun careers in other fields.

■ **Increased production of 1970s cohorts.** What, then, explains the greater propensity of the 1970s cohorts to eventually become RNs relative to the 1960s cohorts? One explanation is that the nursing profession is drawing entrants from a different, and potentially larger, pool than in earlier years—undecided “twentysomethings” looking for a fresh start, as opposed to career-minded late teens aiming for one of the few professions then available to them. A second explanation is that in response to the current shortage of RNs, a sizable number of foreign-born RNs have entered the United States: Foreign-born RNs now account for 14 percent of the current workforce, up from less than 9 percent in 1994.¹⁷ Most of these recent entrants were under age forty, thus contributing materially to the size of the 1970s cohorts. Third, the Johnson and Johnson Campaign for Nursing's Future began in early 2002 and thus far has spent millions of dollars on national strategies aimed at recruiting more people into nursing and increasing the capacity of nursing education

programs.¹⁸ And fourth, as told to the authors in many conversations with officials in nursing education programs, 9/11 was a tipping point in many people's decision to become a nurse. Taken together, these developments have fueled interest in nursing and might have helped boost entry among recent cohorts. Still, their potential impact on the current number of RNs in the workforce is limited by the fact that most people who might have been encouraged to enter nursing in 2002 and beyond would not yet have been observed in the workforce by 2005.

■ **Factors that could change projections.** Our latest supply projections are more likely to materialize if additional developments, akin to those mentioned above, do not occur. At the present time, the trend toward later entry seems fairly stable, and there is no reason to expect that the entry age will increase much beyond the thirties or revert to the early twenties. There is greater uncertainty in the level of workforce participation among the late 1970s and 1980s cohorts, who are just beginning to be observed. Future changes in the economy, immigration policy, educational subsidies or incentives, wages, delivery of health care, or society in general could affect future cohorts' propensities to enter nursing.

However, as the sensitivity analyses (Exhibit 5) show, the forecast is not very sensitive to the potential size of future cohorts that have not yet been observed—mainly because by 2020, those cohorts (born after 1982) will constitute barely a third of the total workforce.¹⁹ With respect to those who are already participating in the workforce, changes in retirement trends (which have been relatively stable among nurses over the past three decades) or hours worked (for example, if wages were to increase) could greatly affect the size of the future workforce. Our forecasts of future shortages also are dependent on the accuracy of HRSA's projected demand for nursing FTEs, which is based on projected changes in population demographics, insurance coverage, income, and wages.

■ **Implications for policy.** Policymakers focused on workforce planning should draw

some measure of encouragement from this updated forecast. A smaller shortage implies that the adverse impacts of having too few nurses would be less severe. In addition, because there is a global shortage of nurses that is expected to persist during the foreseeable future, a smaller U.S. shortage will ease the pressure on other countries facing their own shortages. Finally, there is a higher likelihood of successfully combating a shortage of 340,000 (that will take a longer period of time to develop) than the previously forecasted shortfall of 800,000 RNs by 2020.

Actions to alleviate this deficit include encouraging future high school and college graduates to consider a nursing career. But even more useful is to focus on rapidly increasing the current capacity of nursing education programs. Last year, schools of nursing were forced to reject more than 147,000 qualified applicants because of shortages of faculty, classroom space, and clinical placement sites for students.²⁰

Beyond eventually shrinking in size, our projections show that the RN workforce will continue to grow older. To the extent that these older and more experienced RNs remain in the workforce longer, the development of the future shortage will be pushed back in time. Thus, efforts to retain older RNs by improving the ergonomic workplace environment would also help alleviate shortages, as has been noted elsewhere.²¹

Finally, although our new forecasts provide an improved picture of the future supply of RNs, we still anticipate a large shortage developing in the next decade. A shortage of 340,000 is three times larger than the size of the current shortage when it was at its peak in 2001. At that time, many hospitals closed patient programs and nursing units, and the national average hospital RN vacancy rate was 13 percent.²² Thus, the size of the projected shortage based on our revised forecasts continues to constitute a serious threat to access and efforts to improve the quality and safety of health care.

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The views expressed in this paper are those of the authors and should not be interpreted as those of the

Congressional Budget Office, Johnson and Johnson, or the National Bureau of Economic Research. The authors appreciate the suggestions provided by reviewers who commented on an earlier draft.

NOTES

1. P.I. Buerhaus, D.O. Staiger, and D.I. Auerbach, "Why Are Shortages of Hospital RNs Concentrated in Specialty Care Units?" *Nursing Economic\$* 18, no. 3 (2000): 111–116; American Hospital Association, "The Hospital Workforce Shortage: Immediate and Future," *TrendWatch* 3, no. 2 (2001): 1; and P. Buerhaus et al., "Is the Shortage of Hospital Registered Nurses Getting Better or Worse? Findings from Two Recent National Surveys of RNs," *Nursing Economic\$* 23, no. 2 (2005): 61–71, 96, 55.
2. D. Staiger, P. Buerhaus, and D. Auerbach, "Expanding Career Opportunities for Women and the Declining Interest in Nursing as a Career," *Nursing Economic\$* 18, no. 5 (2000): 230–236.
3. P. Buerhaus, D. Staiger, and D. Auerbach, "Implications of an Aging Registered Nurse Workforce," *Journal of the American Medical Association* 283, no. 22 (2000): 2948–2954.
4. Health Resources and Services Administration, *Projected Supply, Demand, and Shortages of Registered Nurses: 2000–2020* (Rockville, Md.: National Center for Health Workforce Analysis, 2002). For more details about HRSA's demand model, see Bureau of Health Professions, "What Is Behind HRSA's Supply, Demand, and Projected Shortage of Registered Nurses?" April 2006, <http://bhpr.hrsa.gov/healthworkforce> (accessed 16 October 2006).
5. HRSA, *Projected Supply, Demand, and Shortages*.
6. P. Buerhaus, D. Staiger, and D. Auerbach, "New Signs of a Strengthening U.S. Nurse Labor Market?" *Health Affairs* 23 (2004): w526–w533 (published online 17 November 2004; 10.1377/hlthaff.w4.526).
7. Projected total workforce growth from 2000 to 2005 in Buerhaus et al., "Implications," which used data through 1998, was roughly 220,000 RNs. In HRSA, *Projected Supply, Demand, and Shortages*, which used data through 2000, projected growth was 120,000 RNs over this same time period. Actual growth from 2000 to 2005, according to the CPS, was 293,000.
8. U.S. Bureau of the Census and U.S. Bureau of Labor Statistics, *The Current Population Survey*, <http://www.census.gov/cps> (accessed 16 October 2006).
9. HRSA uses the same definition of an FTE; we use usual hours worked rather than self-reports to determine part-time status because of inconsistency in the CPS measure of self-reports of part-time status across years. Our measure produces a number of RN FTEs in 2000 and 2004 similar to that of the National Sample Survey of Registered Nurses used by HRSA.
10. Overall forecasts were adjusted by multiplying the projected workforce by 1.03. The counts of RN FTEs under age thirty and over age sixty in Exhibit 4, however, were adjusted separately using ratios based on observed RN FTEs in the CPS under age twenty-three and over age sixty-four.
11. For further details on our methods and forecasting model, see Buerhaus et al., "Implications."
12. See, for example, A. Deaton, *The Analysis of Household Surveys* (Baltimore: Johns Hopkins University Press, 1997).
13. More explicitly, the regression model was constructed as follows: the Natural Log of (RN FTEs/cohort population size) for a given birth year and age = year dummy variables + age dummy variables + (new) a set of interaction terms representing RNs both in their twenties and born after 1965.
14. See, for example, C. Goldin, "The Quiet Revolution That Transformed Women's Employment, Education, and Family," NBER Working Paper no. 11953 (Cambridge, Mass.: National Bureau of Economic Research, January 2006).
15. By entering the workforce later, new nursing cohorts lose potential nursing years in their early and mid-twenties relative to earlier cohorts.
16. American Association of Colleges of Nursing, *Accelerated Programs: The Fast-Track to Careers in Nursing*, March 2005, <http://www.aacn.nche.edu/Publications/issues/Aug02.htm> (accessed 16 October 2006).
17. This is based on the authors' analysis of the same CPS data on which this study is based.
18. See the Johnson and Johnson Health Care Systems Discover Nursing home page, <http://www.discovernursing.com>.
19. In the longer run, the size of the workforce is more related to the size of future cohorts.
20. National League for Nursing, "Despite Encouraging Trends Suggested by the NLN's Comprehensive Survey of All Nursing Programs, Large Numbers of Qualified Applications Continue to Be Turned Down," Press Release, 9 December 2005, <http://www.nln.org/newsreleases/nedsdec05.pdf> (accessed 16 October 2006).
21. P.I. Buerhaus, D.O. Staiger, and D.I. Auerbach, "Is the Current Shortage of Hospital Nurses Ending?" *Health Affairs* 22, no. 6 (2003): 191–198.
22. AHA, "The Hospital Workforce Shortage."