The demand for physicians, registered nurses (RNs), dentists, behavioral health therapists (to name a few) is derived from the society’s overall demand for health care. Over the next 2 decades, the demand for health care, and hence the health care workforce, is expected to increase. Among the major drivers of the expected increased demand include: population-related factors (growth in the total size of the population, aging of the baby boom generation, growing numbers of people with multiple chronic conditions); continued innovation and adoption of diagnostic, treatment, and monitoring technologies; and expansion of health insurance coverage to 32 million Americans beginning in 2014. Awaiting this increase in demand is a health care workforce in which many practitioners, particularly RNs and primary care physicians, have been projected to grow more slowly than in the past, possibly leading to shortages (Association of American Medical Colleges, 2010). These and other projections depend on accurate sources of workforce data. A recent Institute of Medicine report The Future of Nursing emphasized gaps in timely and accurate workforce data and recommended “building and infrastructure for the collection and analysis of inter-professional health care workforce data” (IOM, 2010, p. 6-10).

Many nursing workforce studies have relied on the Health Resources and Services Agency’s (HRSA) National Sample Survey of Registered Nurses (NSSRN) to analyze a variety of issues relative to the RN workforce, including:

**EXECUTIVE SUMMARY**

- The termination of the National Sample Survey of Registered Nurses (NSSRN) represents a loss of a key source of information on the nursing workforce that has been available for more than 30 years.
- At the same time, this loss presents new opportunities to address some of the biases associated with using licensing data to construct lists of RNs to construct a sampling frame.
- Given the loss of this key national data source on the nursing workforce, the NSSRN is compared to existing alternatives for nursing workforce data in two U.S. Census Bureau surveys: the Current Population Survey and the American Communities Survey.
- The endeavor of workforce planning and a deeper understanding of whether we are equipped to meet the nation’s changing health care landscape will benefit from a thoughtful consideration of how best to obtain accurate and comparable data from future surveys.

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ing trends in racial and ethnic composition, and projecting the future demand and supply of RNs (HRSA, 2004; Sochalski, 2002). The NSSRN has been conducted every 4 years since 1980, contains detailed information about demographic characteristics of RNs, their education, employment, and education, and is widely recognized as the “gold standard” for descriptive data on the population of RNs licensed to practice in the United States. Similar to surveys conducted for other health professions (e.g., nurse practitioners and pharmacists), the NSSRN uses state licensing databases to draw a sample of RNs to obtain data on a variety of trends and characteristics of the nursing profession (American Academy of Nurse Practitioners, 2010; American Association of Colleges of Pharmacy, 2010).

Recently, HRSA indicated it will no longer conduct the NSSRN in its traditional format but will instead gather information about the RN workforce through periodic surveys. Given the loss of this key national data source on the nursing workforce, we seek in this article to compare the NSSRN to existing alternatives for nursing workforce data from two U.S. Census Bureau surveys: the Current Population Survey (CPS) and the American Communities Survey (ACS). During the past decade, we have published projections of the age and size of the RN workforce using these data sources (Auerbach, Staiger, & Buerhaus, 2011; Buerhaus, Staiger, & Auerbach, 2000). While they contain data on employment of RNs, the census-based surveys are not RN-specific and lack important detail available in the NSSRN.

Through this comparison, we will draw conclusions about what will be lost and gained in moving to the census surveys as the main source for data on the RN workforce (some of the losses and gains may be generalizable to any licensing data-based survey versus household-based surveys) and will provide suggestions to mitigate the potential losses. While some exploratory comparisons were made between the 2008 ACS and the 2008 NSSRN in the technical documentation of the findings from the 2008 NSSRN survey (HRSA, 2010), we provide a more comprehensive comparison of the key demographic, education, and employment characteristics of the RN workforce.

Data

Data for the comparison of nursing workforce characteristics come from three national surveys covering overlapping ranges of years: the NSSRN from 1980 to 2008, and the CPS from 1980 to 2008, and the ACS from 2001 to 2008. Detailed description of the population, sampling frames, sample strategies, modes of administration, response rates, sources of sampling error, weights to make responses representative of the population of RNs, and other information is provided on each survey’s website or in recent documentation (HRSA, 2010; U.S. Census Bureau, 2012a; 2012b).

Briefly, the NSSRN is a mail survey administered to a national random sample of RNs based on licensed RNs reported in state licensure databases. Since 1980, each of the NSSRNs have obtained more than 30,000 completed surveys, but as Figure 1 indicates, response rates have been falling from roughly 80% during early administrations of the survey to just over 60% in recent surveys. The surveys provide sampling weights based on the RN population recorded in the state licensure data, with adjustments, in some cases, to account for possible non-response bias. Although the NSSRN is most well-known for its descriptive data on RN employment, education, and demographic characteristics, including the country where RNs received their nursing education, data are also reported on advanced practice registered nurses (certified nurse anesthetists, certified nurse midwives, nurse practitioners, and clinical nurse specialists).

The CPS is a household-based, nationally representative survey of over 100,000 individuals administered monthly by the U.S. Census Bureau. The current survey of employment and earnings began in 1979 and data have been combined into an annual sample and made available on the website of the National Bureau of Economic Research. The survey
focuses on occupation and employment characteristics of the U.S. population. The survey is administered by mail with telephone followup, and obtains a response rate exceeding 90%. The CPS gathers information from one household respondent who provides information on behalf of all other household members (nearly half of the data on individuals in the CPS, therefore, is information provided by other household members or “proxy respondents”). A recent analysis suggests this imparts a small bias in earnings estimates (Bollinger & Hirsch, 2007). RNs are identified in the CPS based on the respondent choosing the occupational category “Registered Nurse.” If not working at the time of the survey, respondents are asked about the most recent occupation in the last 5 years. When data on RNs from the monthly surveys are aggregated, the CPS obtains employment information on roughly 3,000 RNs each year. We have used CPS data to estimate national employment and earnings trends for RNs, including by major employment sector (e.g., hospitals), and to project the age and supply of RNs and of physicians (Auerbach et al., 2011; Staiger, Auerbach, & Buerhaus, 2009).

The ACS, which began in 2001, is the newest of the three surveys. This survey, also conducted by the U.S. Census Bureau, is modeled after the long form of the decennial census. Although it contains fewer questions than the CPS or NSSRN, it obtains a much larger sample size (more than 500,000 households from 2001 to 2005 and nearly 2 million starting in 2005). Like the CPS, the ACS obtains data from one respondent in the household and also obtains a response rate of over 90%. In each year from 2001 to 2004, the ACS obtained data on approximately 12,000 RNs, and after expanding its sample in 2005, surveys include data on roughly 30,000 RNs in each year, nearly matching the number of RNs obtained in the NSSRN. We have recently used the ACS to assess recent trends in the number of young RNs entering the workforce and the impact on the future age and supply of RNs (Auerbach et al., 2011).

Variable construction. We compared employment, demographic, and education data across the three surveys from 1980 to 2008 (the years for which both the CPS and the NSSRN were available) and beginning in 2001 for the ACS.

Employment variables. For all three surveys, estimates are weighted by full-time equivalent (FTE) RNs. RNs working at least 30 hours per week are considered 1 FTE and RNs working between 1 and 30 hours per week are considered 0.5 FTE. Estimates of employment and hours worked are constructed slightly differently across the surveys based on differences in survey questions. In the CPS, respondents either working or with a job but not at work in the past week (due to vacation, illness, labor disputes, etc.) were considered working and counted in employment totals. All reported FTEs are considered FTEs working in nursing, given that respondents had to actively choose their occupation as an RN. In the NSSRN, individuals are asked whether they were employed or self-employed in nursing as of a certain date, or whether they are employed in non-nursing jobs.

With respect to hours worked in the CPS, respondents are asked about usual hours worked for the job referred to in the employment question. For respondents who chose “hours vary” (and as coded as missing), we replaced the missing hours with data from a subsequent question about hours worked in the previous week. The ACS asks respondents about usual hours worked over the past 12 months. The NSSRN changed its hours question between 2004 and 2008. In 2004, it asked respondents about hours worked (including paid hours of on-call duty and overtime) in their last full workweek. In 2008, the question switched to the numbers of hours worked in a typical week, similar to the CPS and ACS.

Demographic variables. We restricted our comparison of the three surveys to RNs aged 21 to 64, a range that comprises more than 95% of the FTE workforce. Age, gender, race, and marital status questions were consistent across the surveys. RNs indicating they were married but living apart were considered married, and all Hispanic respondents were considered Hispanic, such that all other reported races include only non-Hispanics. With respect to education, the NSSRN, unlike the census surveys, includes the diploma option which is a 3-year hospital-based program unique to RN education. For the CPS and ACS, respondents who had earned associate’s, bachelor’s, master’s degrees or higher were coded as such, while those indicating less education than an associate’s degree (roughly 5% of the sample) were not coded (thus, the education categories for the census surveys do not add to 100%). It is unclear how diploma graduates may have responded when faced with the census educational categories and thus the comparison of educational levels is not precise.

Country of birth or year of immigration is not reported in the NSSRN, which does, however, report if RNs obtained their basic RN education in a foreign country. The ACS and CPS year of immigration variables were used to derive whether the RN immigrated to the country after the age of 25, a proxy for those who may have been educated in a foreign country. Earnings were not consistently reported in the NSSRN.
and the ACS – both asked the RN’s own wage and salary income for the previous year (which was recorded in the results for full-time RNs only). The CPS asks for hourly wages and is not reported in the results because of limited comparability.

**Results**

The results of the survey comparisons are organized into three sections: (a) Time-series results for key workforce characteristics measured consistently across surveys, (b) 2008 results for workforce characteristics measured inconsistently across surveys, and (c) A tabular listing of measures and domains included in one survey but not the others.

**Time-series results for key workforce characteristics measured consistently across surveys.**

As shown in Figure 2, FTE employment totals are generally consistent with the exception that the NSSRN appears to have estimated lower employment totals in recent years. According to the 2008 survey data, roughly 200,000 fewer RNs were working as FTEs in nursing (roughly 7.5% below the CPS and the ACS). The total number of FTEs is quite similar across surveys although the NSSRN obtains a considerably larger number of RNs working part-time than the CPS or ACS. Because all questionnaires ask about hours worked in a typical week for the referenced nursing position, and because part-time is defined based on hours worked, it is unclear why the number of part-time RNs differ by such a large degree.

Turning to a comparison of demographic characteristics, the percentage of female RNs estimated from the three surveys was closely aligned, although the NSSRN consistently found roughly one percentage point more female RNs (see Figures 3a-3d). Beginning with the 1988 survey, the NSSRN estimated a higher percentage of married RNs, with the divergence growing steadily over the years from several percentage points to seven percentage points by 2008 (73% vs. 65% in the CPS and 66% in the ACS). As with the percentage of RNs who were married, the difference in the percentage of RNs under age 30 appears to have increasingly diverged between the two surveys over time, with the NSSRN finding 9.6% of RNs under the age of 30 in 2008 versus 13% or 14% for the census surveys. The latter percentages represent an increase from 2004, which is not seen in the NSSRN data. Even more striking, the NSSRN has consistently estimated about half as many of Black RNs as has the census surveys.

**2008 results for workforce characteristics measured inconsistently across surveys.**

There are a number of RN characteristics and workforce variables that are not comparable across the surveys but are important for workforce measurement, some of which are shown for 2008 in Table 1. For example, undergraduate educational attainment is not entirely consistent among the surveys, mainly because the census-based surveys do not identify the diploma nursing degree option. The percentages of RNs reporting an associate degree are quite similar across surveys, suggesting diploma-educated RNs may tend to report bachelor’s degrees in the census. Regarding graduate education, the proportion of RNs with a master’s degree is quite similar across surveys. Although RNs educated internationally are reported in the NSSRN but not the CPS or ACS, data from the census on when RNs immigrated to the United States are reported. Using immigration after age 25 as a proxy for those who attended international nursing programs yields fairly similar percentages (roughly 7%) to the percentage identified in the NSSRN as internationally educated.
Earnings are not measured annually in the CPS merged outgoing rotation groups, but rather, on a weekly basis. Although an annual estimate could be constructed, the difference in the question framing could result in inaccurate comparisons. The annual earnings reported in the NSSRN and the ACS are somewhat consistent. The earnings reported in Table 1 for the NSSRN are based on combined earnings from questions about earnings from the RN’s principal nursing position (among full-time

Table 1.
Aspects of the Nursing Workforce Measured Inconsistently Across Surveys, 2008

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>NSSRN</th>
<th>CPS</th>
<th>ACS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education (highest level obtained)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diploma</td>
<td>11.0%</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Associate degree</td>
<td>38.6%</td>
<td>34.4%</td>
<td>37.6%</td>
</tr>
<tr>
<td>Baccalaureate degree</td>
<td>37.4%</td>
<td>48.4%</td>
<td>42.8%</td>
</tr>
<tr>
<td>Master’s and higher</td>
<td>12.9%</td>
<td>12.0%</td>
<td>12.2%</td>
</tr>
<tr>
<td>Immigrated to U.S. after age 25</td>
<td>n/a</td>
<td>7.4%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Educated in foreign country</td>
<td>6.3%</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Annual earnings (full time only)</td>
<td>$68,700</td>
<td>n/a</td>
<td>$60,100</td>
</tr>
</tbody>
</table>

Figure 3.
Percentage of RNs Who Are Married, Under Age 30, Black, and Female, According to the CPS, NSSRN, and ACS, 1980-2008

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RNs only), other nursing positions (representing 2.7% of total earnings among all full-time RNs), and non-nursing positions (0.6% of total earnings). The ACS contains several earnings questions including wage and salary income, total personal earned income, and total personal income. We determined total personal earned income was the most comparable measure across the surveys as reported in Table 1. It is unclear why the earnings reported in the ACS are lower than the NSSRN. Both surveys impute income for those who don’t report, but imputed values make up less than 20% of income reports for both surveys.

Measures and domains included in one survey but not in other surveys. Several measures and domains that the NSSRN captures are not replicated in the ACS and CPS – particularly those pertaining to nursing – are presented in Table 2.

Among these is detail on education (such as history of an RN’s education, timing of degrees, certifications and area of nursing specialty [e.g., pediatrics, cardiovascular care, etc.]), and how RNs spend their time (e.g., providing direct patient care, documentation, education, administration, etc.). Advanced practice designation (e.g., nurse practitioner) was not included in the occupational codes in the CPS or ACS until 2011. The census surveys, on the other hand, contain information at smaller levels of geography, immigration, and citizenship, and, in the ACS, health insurance and health status.

Discussion

Data from the census-based surveys (PCS and ACS) and the NSSRN depicted a nursing workforce of roughly the same size between 1980 and 2000, but the NSSRN began to estimate a smaller workforce thereafter. The NSSRN has tended to report an older workforce that is more likely to be White, female, and married – particularly in the last two administrations of the survey in 2004 and 2008. The differences in some categories are quite large: most strikingly, the NSSRN finds about half as many Black RNs, fewer RNs under the age 30, and far more married RNs in recent years compared to the census-based surveys.

Though there are limited third-party data sources available from which to assess these differences, at least with respect to the racial composition of the nursing workforce, publicly available enrollment data from the American Association of Colleges of Nursing has tracked the racial composition of baccalaureate nursing students since 2001 (AACN, 2010). The percentage of students who were Black rose steadily from 8% in 2001 to roughly 12% by 2007 – consistent with the racial composition of RNs in the CPS and ACS but twice the levels observed in the NSSRN. Data from the Inter-Professional Education Data System similarly show between 10% and 11% of graduates from nursing educational programs in those years were also Black (National Center for Education Statistics, 2012).

That comparison suggests the possibility the NSSRN data may be biased in counting the racial distribution of the RN workforce. The bias could come from two sources: non-response bias and bias inherent in using state licensing data as a sampling frame. The possibility of the former was suspected in HRSA’s published report on the 2008 NSSRN. In particular, the report noted the possibility of non-response bias resulting in both undercounts of young RNs and Black RNs. Although it is not clear why certain types of RNs may be less likely to respond to mail surveys, the response rate of the NSSRN has been dropping over time, whereas the CPS and ACS response rates have remained above 90% over the 1980-2008 period. If, for example, married RNs are more likely to respond to the survey, a growing non-response bias could be responsible for diverging estimates of the percentage of RNs who are married.

A more fundamental bias, however, may be the NSSRN’s sampling strategy that is based on state licensing lists (from which the survey weights are ultimately derived). In earlier work comparing demographics among physi-

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### Table 2. Non-Comparable RN Characteristics and Workforce Variables Reported in the NSSRN, ACS, and CPS, 2008

<table>
<thead>
<tr>
<th>Domain</th>
<th>NSSRN</th>
<th>ACS/CPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of time spent in various professional activities</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>States where RN is licensed</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Advanced practice RN detail</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Licensed RNs not working in nursing</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Educational timing, financing, and specialty</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Job history and satisfaction</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>More detailed geography (MSA)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Household members and family relationships</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Health insurance and health status</td>
<td>X (ACS only)</td>
<td>X</td>
</tr>
<tr>
<td>Immigration and citizenship detail</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
cians in the AMA Masterfile with census data, we found strong evidence that the lags in which the Masterfile data are updated led to an undercount of young physicians and an overcount of older physicians (Staiger et al., 2009). Similarly, there could be a lag in the time between when new RNs appeared on state licensing lists, while in the census survey there would be no such lag. This difference could explain the lower percentages of younger RNs in the NSSRN and, partly, the lower overall workforce totals in 2004 and 2008 when a surge in younger RNs entered the workforce (Auerbach et al., 2011).

More generally, any group of RNs for whom contact information on state licensing lists might become outdated, rendering those RNs less reachable in mail surveys, could be under-represented in the NSSRN. Single or younger RNs could be more likely to move frequently, possibly explaining their lower representation in the NSSRN. To evaluate this hypothesis, we analyzed variables indicating whether the respondent had moved in the past year in the ACS. Among RNs in the ACS, young RNs (under age 30) were three times more likely to have moved than older RNs, and unmarried RNs were twice as likely. The possibility of this type of bias is inherent in any survey based on licensing data, which is common among the health professions.

In addition to the problem of hampering analyses of workforce supply and demand, such biases could have important policy implications. For example, citing data from the NSSRN indicating that 5.4% of the population is Black, the recent IOM report, *The Future of Nursing: Leading Change, Advancing Health*, stated “...additional commitments are needed to further increase the diversity of the nurse workforce” (IOM, 2010, p. 3-40). Yet, as our comparative analysis has shown, data from the census-based surveys show that the percentage of the RN workforce who are Black is nearly equal to the proportion of Blacks in the U.S. population. However, while the CPS and ACS may be more accurate with respect to certain aspects of the RN workforce due to their sampling strategy (and the added significant advantage that their data are produced annually and are made available much more rapidly following data collection than the NSSRN), these census-based data sources do not include the full richness of descriptive information about the nursing workforce that is contained within the NSSRN. As shown in Table 2, the NSSRN captures elements of the nursing workforce such as the location (state or country), type of degree, and date of the RN’s basic nursing education, when and whether they received a master’s or doctorate in nursing, significant added detail on work setting, how RNs allocate their time, and many other aspects of nursing practice that are useful for workforce analysis and planning. While another strength of the NSSRN has been the identification of nurse practitioners, nurse anesthetists, nurse midwives, and clinical nurse specialists, the first three of those categories are now identified separately in the CPS and ACS data as of 2011.

**Conclusion**

The termination of the NSSRN represents a loss of a key source of information on the nursing workforce that has been available for more than 30 years. At the same time, this loss presents new opportunities to address some of the biases associated with using licensing data to construct lists of RNs to construct a sampling frame. With activity already underway to harmonize data collection efforts across the health professions (Moore, 2011), future national surveys could address biases related to low response rates and licensing-based sampling. For example, two large national surveys (the American Time Use Survey, and the National Survey of College Graduates) currently survey a targeted subsample of respondents obtained from the CPS or ACS (those belonging to the group are identified via screener questions). Using this strategy, it could be possible to obtain a large, representative sample of RNs (or, more broadly, any health care profession) and then follow up with more detailed surveys containing questions of particular interest to that profession. This approach could yield more accurate and comparable workforce data across professions.

Census-based workforce data could also serve as a baseline for adjustment if nurse leaders or other health professionals rely on licensing data or surveys within their profession for detailed workforce data. For example, health professionals, by category (such as race, gender, etc.) could be reweighted to match ACS distributions by those same categories to help remove bias in the data.

We also note that HRSA is currently engaged in efforts to coordinate and rationalize state and other workforce data collection activities through various Minimum Data Sets. These activities could also be informed by the lessons herein.

Finally, new CPS or ACS codes could be included in future surveys, such as additional industry codes that could help illuminate how providers are allocated across the health care delivery system. That would improve the utility of the census surveys to directly assess workforce trends such as whether nurse practitioners are increasingly working in inpatient, clinic, or ambulatory care settings – ultimately informing decisions about the primary care workforce. In any case, the endeavor of work-
force planning and a deeper understanding of whether we are equipped to meet the nation’s changing health care landscape will benefit from a thoughtful consideration of how best to obtain accurate and comparable data from future surveys.

REFERENCES

ADDITIONAL READING