Changes to the Design of the National Health Interview Survey to Support Enhanced Monitoring of Health Reform Impacts at the State Level

Lynn A. Blewett, PhD, MA, Heather M. Dahlen, PhD, MA, Donna Spencer, PhD, MA, Julia A. Rivera Drew, PhD, and Elizabeth Lukanen, MPH

Pursuant to passage of the Patient Protection and Affordable Care Act, the National Center for Health Statistics has enhanced the content of the National Health Interview Survey (NHIS)—the primary source of information for monitoring health and health care use of the US population at the national level—in several key areas and has positioned the NHIS as a source of population health information at the national and state levels.

We review recent changes to the NHIS that support enhanced health reform monitoring, including new questions and response categories, sampling design changes to improve state-level analysis, and enhanced dissemination activities.

We discuss the importance of the NHIS, the continued need for state-level analysis, and suggestions for future consideration. (*Am J Public Health*. 2016;106: 1961–1966. doi:10.2105/AJPH.2016.303430)

The National Center for Health Statistics (NCHS) was authorized under Section 306 of the Public Health Service Act and is 1 of 13 federal statistical agencies.[1] This important designation puts public health data on the same level as federal data used to monitor the economy, job growth, and other trends important to national decision-making, business development, program evaluation, and as inputs to federal allocation mechanisms.

The NCHS maintains 3 population surveys that focus on the nation's health. The National Survey of Family Growth monitors trends in family life, marriage and divorce, infertility, and contraception use; the National Health and Nutrition Examination Survey monitors the health and nutritional status of adults and children; and the National Health Interview Survey (NHIS) has been the primary source of information for monitoring the health and health care use of the US population.[2]

The NHIS has been in continuous operation since 1957, making it one of the longest-running health surveys in the world.[3] In 2010, the passage of the Patient Protection and Affordable Care Act (ACA) created a need for new data to monitor and evaluate health reform implementation. There was a particular need for data at the state level to support decision-making on many state-level implementation decisions. In response, the NCHS has made several survey design adjustments to address these new data needs.

We provide an overview of the NHIS and review notable changes to the survey that are enhancing the utility and relevance of the data for monitoring health reform at both the state and national levels.

DESIGN AND CONTENT THROUGH 2017

The principal objective of the NHIS is to collect and analyze data on the civilian noninstitutionalized US population on a wide range of health topics. The survey provides population-based estimates of health insurance coverage, health status, and health care utilization with a sufficient sample size to allow analyses on the basis of age, race, gender, income, and other population characteristics.[3]

Each year, the NHIS samples approximately 87 500 persons (adults and children) residing in 35 000 households. Data are collected via cross-sectional in-person household interviews occurring continuously throughout each year (note that 35 000 household records and 87 500 individuals' records represent sample sizes without cuts or augmentation. For example, with the sample augmentation in 2014 there were more than 60 000 households and 112 000 individuals sampled).[3,4]

Between 2006 and 2015, the sample was grounded in a multistage area probability design. In the first stage, the sample included more than 400 primary sampling units, such as a county, small group of counties, or metropolitan statistical area, from roughly 1900 units covering all 50 states and the District of Columbia. Within each primary sampling unit, addresses and building permits were sampled. During this time, the design oversampled African American, Hispanic, and Asian persons.

ABOUT THE AUTHORS

Lynn A. Blewett, Donna Spencer, and Elizabeth Lukanen are with the State Health Access Data Assistance Center, Division of Health Policy and Management, University of Minnesota School of Public Health, Minneapolis. Heather M. Dahlen is with the Medica Research Institute, Minneapolis, MN. Julia A. Rivera Drew is with the Minnesota Population Center, University of Minnesota, Minneapolis.

Correspondence should be sent to Lynn A. Blewett, PhD, State Health Access Data Assistance Center (SHADAC), University of Minnesota School of Public Health, 2221 University Ave, Suite 345, Minneapolis, MN 55414 (e-mail: blewe001@umn.edu). Reprints can be ordered at http://www.ajph.org by clicking the "Reprints" link.

This article was accepted July 30, 2016.

doi: 10.2105/AJPH.2016.303430

Although the sample is drawn from each state and Washington, DC, the NHIS sample design focuses on national-level estimates. State-level analysis is limited to states with adequate sample sizes and must be conducted in an NCHS research data center because state identifiers are not included in the public use files.

As of 2016, the NHIS sample has been redesigned in a manner that still prioritizes national estimation but allows flexibility to support state estimation.[5] Moving forward, the base number of sampled households will remain similar to the current sample size. However, whereas the majority of sampled households (~70%) will continue to be allocated proportionally to state population totals each year, a segment of the sample will be allocated annually on the basis of the need to oversample certain populations or increase individual state samples. For 2016, the sample size has been reduced in the 40 most populous states and increased in the 10 least populous states and Washington, DC. In future years, the NCHS director will have the ability to reallocate a segment of the sample annually on the basis of NCHS survey priorities.

The NHIS questionnaire has evolved over time. In 1982, it was split into 2 components: (1) the core questionnaire, which included demographic and basic health items, and (2) 1 or more questionnaire modules reflecting current health topics (Appendix A [available as a supplement to the online version of this article at http://www.ajph.org]).[6] Although the core included items related to health conditions and health care utilization, specific measures of health insurance coverage, access to care, and health behaviors were included only intermittently, making trend analysis difficult. The core was revised in 1997 to include annual measures of health insurance coverage, health care access, and health behavior questions.

The 1997 redesign split the core into 4 major components—household, family, sample adult, and sample child—and created supplements to respond to specific public health data priorities. Since then, the core components have remained mostly unchanged. The household component collects limited demographic and relationship information about all the individuals living at the sampled address. The family component collects additional demographics on each family member and asks about health status, limitations, injuries, health care access and utilization, health insurance, and income and assets. The sample adult and sample child questionnaires collect information on health care service utilization, health behaviors, and health status for 1 adult and 1 child (if applicable) randomly selected from each family. All 4 core components collect information about individuals' current status and experiences in the past.

2018 QUESTIONNAIRE REDESIGN

Efforts are currently under way to significantly redesign the NHIS questionnaire in 2018, which will be the first redesign in 20 years.[7,8] Since October 2015, the NCHS has solicited stakeholder feedback regarding the redesign. The goals of the redesign include improvements in survey methodology, a reduction in respondent burden, and enhanced coordination with other federal surveys. To date, the largest departure from previous NHIS data collection will be the elimination of the family questionnaire component and a shift of this content to the sample adult and sample child modules.[9] Demographic information such as age, gender, race/ethnicity, and military status will still be requested from all household members; employment status will be requested from all household adults; and questions such as family size and structure, family income, and housing information will be requested from the household or family unit.

Beginning in 2018, the NCHS will limit the collection of the full set of health, health insurance, and health care access and utilization information to the sample adult and child modules. In the past, some of these measures were requested from all survey respondents. For example, self-reported health status, type of health insurance coverage, and delays in necessary medical care have been requested from the full sample since 1972, 1976, and 1993, respectively.[10] These changes are designed to decrease respondent burden, but there are concerns about the decrease in sample sizes for many measures, including the health insurance, access, and utilization measures.[9]

In addition to these changes, the new sample adult and child questionnaires have been restructured to contain 4 components: annual core, rotating core, sustaining supplement, and periodic supplement. The annual core questionnaire will feature the same questions from year to year, and the rotating core questions will vary, reflecting NCHS content priorities. Note that at this time, the order and periodicity of the rotating core content is still under consideration. NHIS supplements include questions funded by other federal agencies, including the Agency for Healthcare Research and Quality and the Center for Mental Health Services.[11] Sustaining sponsors fund a series of questions over multiple years, whereas periodic supplements can be used to support questions in a single year or only periodically.[9] An estimated 35 000 sample adult and 12 000 sample child interviews will be completed each year.

As of July 2016, topics for the 2018 NHIS redesign are still under consideration.[9] Questions regarding health (including self-reported health status and chronic disease), health insurance coverage, and health care access and utilization will be asked each year as part of the annual core content for the sample adult and child questionnaires. The rotating core content will include topics that are repeated in 2-year intervals (e.g., anxiety and depression; alcohol, walking, sleep, and smoking history and injuries for sample adults; injuries for sample children) and 1-year intervals (e.g., mental health, stressful life events, providers, conditions, physical activity, and sleep for sample children; preventive services and chronic pain for sample adults).

POLICY-RELEVANT QUESTIONNAIRE CHANGES

In 2011, the NCHS created a series of supplemental questions to provide measures to evaluate the impact of the ACA. The questions addressed the broad goals of the ACA to improve access to affordable health care as

well as questions related to specific policies such as young adult provision, coverage for individuals with preexisting health conditions, and first dollar coverage for preventive care.[10,12] The questions are intended to be included in future years of the NHIS, contingent on available funding. A list of the ACA-related questionnaire items is included in Appendix B (available as a supplement to the online version of this article at http://www.ajph.org).

One of the major goals of the ACA was to broaden access to health care by expanding health insurance coverage. The core NHIS health insurance questions were expanded to ask whether individuals had coverage for the past 12 months, how current insurance status compared with coverage status from 1 year ago, the last type of coverage a person had if uninsured, how private insurance was obtained, and whether an employer or union provided contributions to help pay for the cost of coverage.

As of 2010, the ACA allows young adults to remain on their parents' health insurance plans until their 26th birthday. The NHIS incorporated new questions to help identify whether young adults were covered by a parent's plan, whether respondents were related to the policyholder under whom they were insured, whether an insurance plan covered anyone outside the household, and who was covered under the plan that lived somewhere else.

Starting in 2014, health insurance marketplaces became available for individuals and small employers to find, compare, and purchase private health insurance, including subsidized coverage for individuals with lower incomes. The NHIS included new questions about whether an individual had coverage that was directly purchased (e.g., not through an employer, union, or government program) during the past 3 years, the household members covered by that plan, and whether it was difficult to find the plan. In 2013, the NHIS began asking if individuals tried to find health insurance coverage through a state or federal marketplace and also created an algorithm to estimate whether an individual obtained coverage through the marketplace.[13]

Before the ACA, health insurers routinely denied coverage to individuals with preexisting health conditions or charged much higher premiums. In 2014, the ACA compelled insurers to issue health insurance regardless of an individual's health status. In 2011, the NHIS included questions capturing whether a person had been denied health insurance coverage, was charged a higher price, or was excluded from coverage because of a health problem and the reasons a health insurance plan was not purchased (e.g., whether it was because of a preexisting condition).

Effective in 2010, the ACA required all new group and individual health plans to cover recommended preventive services as part of a set of required essential health benefits. In the past, NHIS respondents were asked if they had ever had a mammogram, been tested for colon cancer, had their blood cholesterol checked, been tested for diabetes, or talked with a health professional about diet and smoking. In 2011, the NHIS included questions about whether adults had received these preventive services in the past 12 months.

Health Care Access and Utilization

For many years, the NHIS has included questions about access to health care, including having a usual source of care, emergency department (ED) use, reasons for delayed care, and provider access. In 2011, survey questions were modified to capture the reasons respondents did not have a usual source of medical care, and the survey extended the usual source of care questions to sample child respondents.

Historically, questions related to ED use captured an individual's number of ED visits in the past 12 months, whether these visits were for asthma, and whether the ED was an individual's usual place for medical care. The NHIS now asks respondents whether the most recent ED visit occurred at night or on the weekend, whether the ED visit resulted in a hospital admission, and the reasons for the ED visit.

The NHIS has included questions about delaying needed medical care. In 2011, the questionnaire asked about the specific reasons for delaying care, including whether an individual was told that a provider was not accepting new patients or that their health insurance was not accepted. The NHIS added questions about whether an individual was able to find a doctor despite the waiting time experienced to obtain an appointment or time spent in the waiting room. Questions about reasons for not having a usual source of care and waiting time to see a doctor were later removed in 2015.

For several years, the NHIS has asked whether respondents had to delay medical care owing to cost and whether they needed but could not afford care. In 2011, the NHIS began asking whether individuals needed but could not afford follow-up care or specialist visits, were worried about paying medical bills, asked their doctor to lower the cost of medical bills, and took steps to save money on prescriptions. Items were also added to gauge individuals' confidence in their ability to afford health insurance and care, whether an individual had trouble paying medical bills, and how difficult it was for them to find affordable health care coverage.

Affordable Care Act Questions

Inclusion of the ACA supplemental questions has greatly improved the data available for evaluation of this historic law. Published research has addressed whether patients experienced trouble accessing a provider who would take their insurance,[14] patterns of e-cigarette use,[15,16] strategies to reduce prescription drug costs,[17] Internet use for health information,[18] and problems paying medical bills.[19] In addition, the Early Release Program has provided the first federal survey estimates of the impact of the ACA on increases in health insurance coverage. Because most coverage provisions of the ACA did not go into effect until 2014, it is still very early, and we expect to see many more impact studies using the NHIS measures. An important value of the NHIS was its flexibility to add relevant policy questions in a relatively short time frame, a feature not often available across federal surveys.

Despite the great value of the redesigned NHIS, there are limitations. For example, although questions about dependent coverage make it possible to determine relationships between

the policyholder and the beneficiary, pre–post study designs to analyze the effect of the ACA dependent coverage provision are not possible because the questionnaire revisions to collect this information were implemented after the provision took effect. Also, some questions have produced data that may be unusable to support specific analysis. For example, 90% of respondents could not answer whether an employer contributed financially toward their coverage (authors' analysis of 2011–2014 NHIS data).

Looking ahead to the 2018 questionnaire redesign, the NCHS faces difficult decisions about what content to keep as it works to shorten the questionnaire. Evaluation of health reform requires measures of health care coverage and access as well as both individual and family characteristics. The elimination of the family questionnaire has generated concerns about the loss of data important for understanding family composition and context, health insurance coverage within family units, and health disparities.[20] The implications of the NHIS 2018 questionnaire redesign for studying health reform will be more evident as additional information becomes available about the final 2018 instrument.

ADVANCEMENTS IN STATE ESTIMATION

The consequences of the ACA vary across the states, making state-specific measures critical for effective monitoring and evaluation. States have had significant flexibility in the implementation of the law. For example, states were given the option of developing a state-based marketplace, defaulting to the federally facilitated marketplace, or establishing a hybrid federal–state partnership model. States also made important decisions on whether and how to expand their state-administered Medicaid programs. In addition, state variation that preceded the ACA, such as rates of health insurance coverage, population demographics, and differences in health care financing and delivery, all play a role in evaluating the impact of the ACA. For these reasons, it is critically important to have state-level estimates of health care access and utilization to both monitor the varying impacts of the ACA and provide information to support state-level decisions regarding reform.

The original intent of the NHIS was to generate national information about the health and health status of the US population. The NHIS sampling frame was not specifically designed for state-level estimation. Historically, however, the NHIS has had sufficient samples to support design-based state-level estimation methodologies for large and midsized states.[21] Even before ACA implementation, there was interest in adjusting the sample design and increasing the sample size to afford more efficient state-level estimates.[22,23] The demand for data to monitor ACA impacts has only increased the need for state-level estimates from the NHIS.

Between 2000 and 2015, the NHIS sample size varied on the basis of NCHS annual budget decisions coupled with an interest in increasing state samples. The overall sample was reduced in 2006 and 2007 to accommodate budget shortfalls[3] and was augmented when funding became available.[24] Beginning in 2011, the NHIS sample was expanded in 32 states and Washington, DC, with the explicit goal of expanding the number of states for which reliable state-level estimates could be produced (Appendix C, available as a supplement to the online version of this article at http://www.ajph.org).[24] In 2011, the sample size was increased by 13%, and in 2012, by 21%.[24] In 2013, the NCHS expanded the number of primary sampling units in some states to further expand the sample.[24] Before 2011, sample sizes for single states were relatively small. However, as a result of the continued sample augmentation, particularly for less populous states, the ability to produce state-level estimates has improved over time.

In the absence of publicly available state identifiers, a primary source of state-level analyses has been the NCHS's annual release of state-level estimates of health insurance coverage. Using the national survey weight (calibrated to the US noninstitutionalized civilian population), the NCHS produced state-level estimates as part of the Early Release Program for 10 states in 2004 and 20 states in 2005 and 2006.[25,26] In 2007, the NCHS began using a Taylor series linearization method for estimation of standard errors for the 10 states with the largest sample sizes, and for other states, an estimated design effect to calculate standard errors.[27] The NCHS has combined the estimated design effect with an overall sample increase to expand estimates to 32 states in 2011[28]; 42 states and Washington, DC, in 2012[29] and 2013[30]; and all 50 states and Washington, DC, in 2014[31] and 2015.[32]

Additional state-level NHIS estimates became available when the State Health Access Data Assistance Center obtained state identifiers via the University of Minnesota Research Data Center[33] and began producing estimates of insurance coverage and health care access, affordability, and utilization in 2011.[34] For 2011 and 2012, NHIS access measures were available for 48 states and Washington, DC, and for 2013, measures were available for all 50 states and Washington, DC. (Note that the number of states for which single-year estimates are available differs between State Health Access Data Assistance Center and NCHS because of restriction criteria. In addition to suppressing estimates when the number of sample cases is too small or the relative standard error is too high [greater than 50%], NCHS does not produce estimates when a state has fewer than 1000 individuals' interviews [or 300 children].[34]) State Health Access Data Assistance Center estimates are suppressed when the state sample is too small to develop reliable estimates and are on the basis of the national weight. Additional measures will be available each year (J. Turner, e-mail interview, March 1, 2016).

DISSEMINATION INITIATIVES

NCHA has developed an active dissemination strategy for the NHIS that has enhanced its utility for monitoring health care reform. Two key initiatives have improved the timeliness and accessibility of the data: the NCHS Early Release Program and the Minnesota Population Center's Integrated Health

Interview Series (IHIS) harmonized data access portal.

Early Release Program

The NCHS issues 5 NHIS Early Release Program products that allow data users to access static reports and microdata files in advance of the annual NHIS microdata file release, which occurs in June following the year of data collection.[6] Beginning in September of each year, an online report of select measures is released, including a specific report on health insurance coverage estimates. Both reports include data from January through March of the same year, with subsequent quarterly reports released on the basis of additional 3-month data increments.

The third early release product is published approximately between May and December and provides estimates of wireless and landline telephone use at both the individual and household levels. The fourth product includes reports and tabulations on the basis of special topics that are released throughout the year. The final product includes preliminary quarterly microdata files (available only to users inside a research data center). In 2015, the NHIS Early Release Program accelerated the release of several of their reports by about 1 month.

Online Data Access

The IHIS[10] is a harmonized set of data and documentation derived from material originally included in the NHIS public use files and distributed for free over the Internet. IHIS variables are given consistent codes and are thoroughly documented to facilitate cross-temporal comparisons. The IHIS addresses key problems with discontinuities in NHIS variables, which complicate and confound analyses of change over time.

IHIS is not a collection of compiled statistics but a readily accessible set of annual microdata. Each record represents a person, and the records are organized into households, making it possible to study the characteristics of people in the context of their families or other coresidents. A data extraction system enables users to select the survey years and variables they require formatted for their preferred statistical package. Researchers may also analyze IHIS data using an online tabulator located on the IHIS Web site. The Web site also provides a searchable online bibliography to locate reports and articles using the IHIS data.

CONCLUSIONS

The NHIS is an invaluable data resource that has been critical to understanding the trends in health and health behaviors in the United States. Unlike other federal surveys that measure health insurance coverage, the NCHS was able to quickly add questions in response to the information needs generated by the ACA. These new questions have allowed researchers to monitor the impact of health reform on health insurance coverage, health care access, and utilization[35–38] and can be used by policymakers who continue to make implementation and operational decisions related to health reform. The flexibility of the NCHS to add questions of national interest cannot be underestimated.

The NCHS has also continued to position the NHIS to produce state-level estimates by supporting a rigorous state sampling strategy and collecting sufficient state samples for the analysis of key subgroups. State-level estimates not only are critical to comparing state variation in ACA implementation but will support research on the next phase of health reform also being driven by states: delivery system transformation.

Improvements to the dissemination of NHIS data have also positioned the survey as a key resource for monitoring health reform. The Early Release Program data are as likely to be cited in academic studies evaluating the ACA as they are to be used by the media to tell the story of health reform's effects at a state level. In addition, through the support of the IHIS, the NCHS is facilitating analysis critical to understanding the long-run public health trends of the US population. The NCHS's Early Release Program has provided the latest estimates of health insurance coverage, which show a continued drop in uninsurance in the first quarter of 2015.[32]

As the NCHS continues to navigate competing priorities related to resources and respondent confidentiality, we advocate a balanced approach that emphasizes state estimation and ease of access. In the near term, we recommend that certain policy-relevant geographic identifiers be included in public use microdata files. For example, variables identify whether individuals live in a state with a federally facilitated or state-based health insurance marketplace or whether individuals live in a state that has expanded Medicaid. We also recommend routine public release of state data files for states with an adequate sample or combined year public use files that include state identifiers.

The NHIS has been a national resource for nearly 60 years. We commend the NCHS on its progress in advancing the ability for researchers to study the rapidly shifting health policy landscape and support continued efforts to position the NHIS as a critical source of information for decision-makers at both the state and national levels. AJPH

CONTRIBUTORS

L. A. Blewett coordinated article preparation and wrote the first draft of the article. H. M. Dahlen drafted the supplemental tables. H. M. Dahlen, D. Spencer, J. A. R. Drew, and E. Lukanen contributed to specific sections of the article. All authors contributed to revising the article and reviewed and approved the final version.

ACKNOWLEDGMENTS

L. A. Blewett and J. A. R. Drew were funded in part by the Eunice Kennedy Shriver National Institute of Child Health and Human Development (grants R01HD046697 and R24HD041023). D. Spencer and E. Lukanen were funded in part by the Robert Wood Johnson Foundation through a grant to the State Health Access Data Assistance Center (ID 73284). H. M. Dahlen was supported by the Medica Research Institute postdoctoral research fellowship.

We would like to thank the anonymous reviewers for their very helpful comments and interest in our article. We would also like to thank the staff of the National Center for Health Statistics for their continued contributions to the National Health Interview Survey.

HUMAN PARTICIPANT PROTECTION

No protocol approval was necessary because no human participants were involved in this study.

REFERENCES

1. 42 US Code §242K, National Center for Health Statistics. Pub L. No. 114–38 (2010).

2. Centers for Disease Control and Prevention. Surveys and Data Collection. Available at: http://www.cdc.gov/nchs/surveys.htm#tabs-1139715-1. Accessed May 12, 2016.

3. Centers for Disease Control and Prevention. About the National Health Interview Survey. Available at: http://www.cdc.gov/nchs/nhis/about_nhis.htm. Accessed February 9, 2016.

4. Integrated Health Interview Series. User Notes: Number of Records by Year. Available at: https://ihis.ipums.org/ihis/userNotes_size.shtml. Accessed June 2, 2016.

5. Moriarity C, Parsons V. 2016 Sample Redesign of the National Health Interview Survey. Paper presented at: National Conference on Health Statistics; August 25, 2015; Bethesda, MD.

6. Centers for Disease Control and Prevention. National Health Interview Survey Early Release Program. Available at: http://www.cdc.gov/nchs/nhis/releases.htm. Accessed June 2, 2016.

7. Blumberg S, Cynamon M. NHIS Questionnaire redesign and content changes. Paper presented at: Meeting of NCHS Board of Scientific Counselors; January 27, 2014; Hyattsville, MD.

8. Moriarity C. Current and future uses of address lists for the National Health Interview Survey. Available at: https://fcsm.sites.usa.gov/files/2014/05/A1_Moriarity_2013FCSM.pdf. Accessed June 2, 2016.

9. Centers for Disease Control and Prevention. National Health Interview Survey: 2018 Questionnaire Redesign. Available at: http://www.cdc.gov/nchs/nhis/2018_quest_redesign.htm. Accessed July 14, 2016.

10. Minnesota Population Center; State Health Access Data Assistance Center. Integrated Health Interview Series: Harmonized Data and Documentation from the US National Health Interview Survey. 2015. Available at: http://www.ihis.us. Accessed July 14, 2016.

11. Centers for Disease Control and Prevention. National Health Interview Survey: NHIS Supplements and Sponsors. Available at: http://www.cdc.gov/nchs/data/nhis/nhis_supplements_and_sponsors.pdf. Accessed July 14, 2016.

12. State Health Access Data Assistance Center. NHIS questionnaire Changes Addressing the Patient Protection and Affordable Care Act. Available at: http://www.shadac.org/publications/nhis-questionnaire-changes-addressing-patient-protection-and-affordable-care-act. 2013. Accessed June 2, 2016.

13. Centers for Disease Control and Prevention. 2014 National Health Interview Survey (NHIS): Rules for Evaluating and Assigning Exchange-Based Coverage." Available at: http://www.cdc.gov/nchs/data/nhis/health_insurance/2014-exchange_coding_-rules.pdf. Accessed June 2, 2016.

14. Cheong C. The first year evidence on the impact of the ACA on patient experience of provider access among Medicaid enrollees. Paper presented at: 6th Biennial Conference of the American Society of Health Economists; June 14, 2016; Philadelphia, PA.

15. Schoenborn CA, Gindi RM. Electronic cigarette use among adults: United States, 2014. *NCHS Data Brief*. 2015;217:1–8.

16. Delnevo CD, Giovenco DP, Steinberg MB, et al. Patterns of electronic cigarette use among adults in the United States. *Nicotine Tob Res*. 2016;18(5):715–719.

17. Cohen RA, Villarroel MA. Strategies used by adults to reduce their prescription drug costs: United States, 2013. *NCHS Data Brief*. 2015;184:1–8.

18. Amante DJ, Hogan TP, Pagoto SL, English TM, Lapane KL. Access to care and use of the Internet to search for health information: results from the US National Health Interview Survey. *J Med Internet Res*. 2015;17(4):e106.

19. Mukherjee K. Impact of affordability on accessibility of medical care post affordable care act in the USA. *J Pharm Health Serv Res*. 2016.

20. Centers for Disease Control and Prevention. National Health Interview Survey: Information About the Proposed Elimination of the Family Questionnaire. Available at: http://www.cdc.gov/nchs/nhis/2018_proposed_elimination.htm. Accessed June 2, 2016.

21. Parsons V. Designing Flexibility for state samples into the redesigned 2016 National Health Interview Survey (NHIS). Paper presented at: 2014 Joint Statistical Meetings Program Committee; August 2–7, 2014; Boston, MA.

22. Blewett LA, Hempstead K. The need for state health services and policy research. *Health Serv Res*. 2014;49(suppl 2):2035–2040.

23. Blewett LA, Davern M. Meeting the need for state-level estimates of health insurance coverage: use of state and federal survey data. *Health Serv Res*. 2006;41(3 part 1):946–975.

24. Moriarity C. The National Health Interview Survey: sample design, sample augmentation, sample redesign plans. Paper presented at: Symposium of the US Statistical Agencies; November 13, 2013; Washington, DC.

25. Cohen RA, Martinez ME. Health insurance coverage: estimates from the National Health Interview Survey, 2004. Available at: http://www.cdc.gov/nchs/data/nhis/earlyrelease/insur200506.pdf. 2005. Accessed June 2, 2016.

26. Cohen RA, Martinez ME. Health insurance coverage: estimates from the National Health Interview Survey, 2005. Available at: http://www.cdc.gov/nchs/data/nhis/earlyrelease/insur200606.pdf. Accessed July 14, 2016.

27. Cohen RA, Martinez ME, Free HL. Health insurance coverage: early release of estimates from the National Health Interview Survey, 2007. Available at: http://www.cdc.gov/nchs/data/nhis/earlyrelease/insur200806.pdf. Accessed June 6, 2016.

28. Cohen RA, Martinez ME. Health insurance coverage: early release of estimates from the National Health Interview Survey, 2011. Available at: http://www.cdc.gov/nchs/data/nhis/earlyrelease/insur201206.pdf. Accessed July 16, 2016.

29. Cohen RA, Martinez ME. Health insurance coverage: early release of estimates from the National Health Interview Survey, 2012. Available at: http://www.cdc.gov/nchs/data/nhis/earlyrelease/insur201306.pdf. Accessed July 16, 2016.

30. Cohen RA, Martinez ME. Health insurance coverage: early release of estimates from the National Health Interview Survey, 2013. Available at: http://www.cdc.gov/nchs/data/nhis/earlyrelease/insur201406.pdf. Accessed June 6, 2016.

31. Cohen RA, Martinez ME. Health insurance coverage: early release of estimates from the National Health Interview Survey, 2014. Available at: http://www.cdc.gov/nchs/data/nhis/earlyrelease/insur201506.pdf. Accessed June 6, 2016.

32. Cohen RA, Martinez ME, Zamitti EP. Health insurance coverage: early release of estimates from the National Health Interview Survey, 2015. 2016. Available at: http://www.cdc.gov/nchs/data/nhis/earlyrelease/insur201605.pdf. Accessed July 16, 2016.

33. Minnesota Research Data Center. Available at: https://mnrdc.umn.edu. Accessed July 16, 2016.

34. State Health Access Data Assistance Center. Available at: http://datacenter.shadac.org. Accessed February 9, 2016.

35. Chen J, Vargas-Bustamante A, Mortensen K, Ortega AN. Racial and ethnic disparities in health care access and utilization under the Affordable Care Act. *Med Care*. 2016;54(2):140–146.

36. Dahlen HM. "Aging out" of dependent coverage and the effects on US labor market and health insurance choices. *Am J Public Health*. 2015;105(S5):S640–S650.

37. Wen H, Druss BG, Cummings JR. Effect of Medicaid expansions on health insurance coverage and access to care among low-income adults with behavioral health conditions. *Health Serv Res*. 2015;50(6):1787–1809.

38. Sommers BD, Gunja MZ, Finegold K, Musco T. Changes in self-reported insurance coverage, access to care, and health under the Affordable Care Act. *JAMA*. 2015;314(4):366–374.