
CHIS Working Paper Series

# CHIS 2019-2020 Redesign: Rationale, Empirical Evaluation, and Trends

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**Executive Summary**

The decline of telephone surveys due to low response rates and cultural shifts in telephone use motivated the UCLA Center for Health Policy Research to consider a methodological redesign for the California Health Interview Survey (CHIS) in order to implement more cost-effective methods. The Center's redesign evaluation process included consultation with experts and two field experiments providing useful data regarding the impact a redesign would have on production. As a result, the overall design for CHIS 2019 production is a **mixed-mode survey** design using an **address-based sampling** (ABS) frame with a **mail push-to-web survey followed by a telephone nonresponse follow-up**.

The primary purpose of this report is to evaluate how the methodological changes impact trending data across cycles. Looking across a broad subset of key CHIS variables in the adult, child, and adolescent surveys, we evaluate whether substantial changes are observed and try to identify the potential source of any shifting trends. Statewide pilot data from 2018 is used as a reference point to guide interpretations related to the redesign. There are three primary reasons for shifts in trends for CHIS 2019:

1) **Sample compositional changes due to sampling frame and mode**

   By using a different sampling frame and introducing a self-administered data collection mode, a different set of households will respond potentially altering the final sample composition. Differences observed in the CHIS 2019 sample composition are:

   - More respondents aged 25 to 64
   - More college graduate respondents, fewer without a high school diploma
   - Increased Asian representation
   - Reduction in Spanish and Vietnamese language completes
   - Double the number of child and adolescent completes from previous years

2) **Measurement changes related to mode**

   Adapting interviewer-administered questions to self-administered in some instances alters the stimulus presented to the respondent. We highlight three such changes:

   ***Previously unread responses.*** Response options that were originally only seen by telephone interviewers (and used if offered by the respondent) must be visually offered to web respondents. The most notable shifts related to this issue are:

   - Gender identity (Provided "other" category increasing reported gender non-conforming, historically grouped with transgendered individuals)
   - Sexual orientation (Provided "other" category increasing reported other sexual orientations besides straight, gay or lesbian, and bisexual)
   - Birth control (Provided "no sexual partner" category shifting "no birth control" responses to "no sexual partner"; considered a break in series)

- Hypertension (Provided "borderline or pre-hypertension" category shifting responses from both the "yes" and "no categories; considered a break in series)

***Social desirability and satisficing*.** Self-administered surveys typically see an increase in reporting of sensitive and undesirable behaviors as respondents may feel self-conscious or judged by an interviewer and choose to provide a more socially desirable response.

***Serial-position effects.*** Aural stimulus, like in telephone interviews, often leads to respondent's choosing later response options (referred to as a recency effect) while web respondents are more likely to select earlier response options when reading through the available categories (primacy effect).

3) **Actual changes in the population over time**

Observing temporal change is an important reason for conducting repeated cross-sectional survey. This is the type of change we want and endeavor to observe.

Based on the evaluations conducted, **CHIS feels assured that data users will be able to trend most substantive variables** related to health conditions, health behaviors, and health care. For variables observed to have unanticipated shifts in trend, we encourage data users to **interpret trends with caution**. Some specific trends where we encourage interpretation with caution are:

- Self-rated health
  - Significant increase in better health categories (excellent, very good, good); possible primacy effect, or related to younger and reduced Latino sample composition.
- Current smoker status
  - Significant decrease for adults, but significant increase for adolescents; possible mode differences; for adolescents, possibly more honest self-reporting.
- Poverty status
  - More respondents in >300% federal poverty level (FPL) group; possibly due to the younger demographic profile, but trend is consistent with shifts observed in American Community Survey (ACS).
- Health insurance
  - Higher employer-based insurance and fewer Medicaid/Medi-Cal enrollees; possibly due to increase in >300% FPL group, but the trend is consistent with shifts in ACS.
- Family type
  - Increase in single parent households; possible change in sample composition.
- English proficiency
  - Fewer limited English proficient; decrease in non-English completes, and increase in college educated respondents.

While this report cannot examine every trend for every variable, it should provide sufficient background and clear examples to help researchers interpret trends and make decisions about whether trending CHIS data across this methodological redesign is appropriate.

UPDATED NOVEMBER 2020

***Version note:*** This updated report corrects errors in reported estimates for a select number of adult, child, and adolescent variables. Adult estimates updated include health insurance type, poverty status, and food security. Child estimates updated include health insurance type and poverty status. Adolescent estimates updated include health insurance type, usual source of care, poverty status, current smoker, and gender expression.

In addition, citations and acknowledgements previously overlooked have been added.

UPDATED JANUARY 2021

***Version note:*** This updated report corrects an error in the reported estimates for serious psychological distress in the past month for adolescents.

## Introduction

Since its inception in 2001, the California Health Interview Survey (CHIS) has been an innovative and invaluable resource for policymakers, researchers, health experts, members of the media and others for credible and comprehensive data on the health of Californians. For nearly 20 years, the CHIS sample design and data collection methodology has remained relatively unchanged using random-digit dialing (RDD) computer-assisted telephone interviews (CATI), with the addition of cell phone RDD following the tremendous growth of cell phone ownership (Blumberg & Luke, 2020).

Over the last few decades, the telephone survey landscape has seen some major changes as new barriers and technologies have developed. The growth of cell phone only households and advent of the smartphone resulted in large cultural shifts in how we communicate (Lavrakas et al., 2017). Telephone interviewing has become more challenging with the proliferation of spam calls, robocalls, and call blocking, as well as the implementation of the Telephone Consumer Protection Act (Lavrakas et al., 2017; Dutwin et al., 2018). This has resulted in some of the lowest response rates ever for telephone surveys, primarily due to upward trends in "no answer" and answering machine call designations (Czajka & Beyler, 2016; Lavrakas et al., 2017; Marken, 2018; Kennedy & Hartig, 2019).

Simultaneously, new and more complete sampling frames based on addresses were developed and allowed for more survey modes to be easily used for data collection giving to the popular rise of mixed-mode surveys (Harter et al., 2016; Olson et al., 2019). Accessibility to the Internet within homes and on mobile devices also brought a new, less expensive way to collect data.

With all of these factors impacting survey research, the sustainability of a telephone-based methodology for CHIS was in question. It was time for the CHIS once again to innovate, and to explore alternative survey methods to remain relevant and viable.

This report will review the process CHIS went through to develop a new sample and data collection methodology and review the final design implemented in CHIS 2019. With any change in methodology comes questions about what that means for those looking at trends over time. The remainder of this report will cover various comparisons between CHIS 2018 and the CHIS statewide pilot of the new methodology as well as trends of key variables from CHIS 2015-2019 along with the statewide pilot.

## Redesign Process

In July 2017, the CHIS team organized the CHIS Redesign Working Group (RWG) made up of survey methodologists and subject matter experts from across the United States. Their goal was to evaluate where CHIS could improve and innovate to accomplish the specific goals of increasing responses, reducing respondent burden, and keeping data collection cost-efficient. The RWG was to provide current best practices used in the field for sample selection and data

collection, guidance and critique of proposed exploratory research developed by the CHIS team related to any methodological changes. In August 2017, the CHIS RWG met for the first time with its eight external experts (listed below with their position as of August 2017) and four ex-officio members from the CHIS team:

- David Dutwin, PhD – Executive Vice President and Chief Methodologist, SSRS; Vice President (2017-2018), American Association for Public Opinion Research (AAPOR)
- Jason Fields, PhD – Survey Director, National Survey of Children's Health (NSCH), United States Census Bureau
- Timothy Johnson, PhD – Director of the University of Illinois at Chicago (UIC) Survey Research Laboratory and Professor of Public Administration at UIC; President (2017-2018), American Association for Public Opinion Research (AAPOR)
- Kristen Olsen, PhD – Associate Professor, Department of Sociology, University of Nebraska – Lincoln
- Nathaniel Schenker, PhD – Retired Deputy Director, National Center for Health Statistics (NCHS)
- Linette Scott, MD, MPH – Chief Medical Information Officer, California Department of Health Care Services (DHCS)
- David Takeuchi, PhD – Professor and Associate Dean for Research, School of Social Work, Boston College
- Andrew Zukerberg – Chief of the Cross-Sectional Surveys Branch, National Center for Education Statistics (NCES)
- Ninez Ponce, PhD, MPH (ex-officio) – Principal Investigator of the CHIS
- Todd Hughes (ex-officio) – Director of the CHIS
- Royce Park (ex-officio) – Assistant Director of the CHIS
- Brian Wells, MS (ex-officio) – CHIS Survey Methodologist and Data Quality Manager

As the RWG reviewed and discussed potential designs, it was done so under a redesign framework based on nine core dimensions founded on the CHIS mission statement:

- Ensure geographic representation
- Ensure diverse racial and ethnic representation
- Collect data for adults, adolescents, and children
- Reduce bias and minimize errors
- Provide cost-effective data collection
- Maintain longitudinal trends
- Ensure efficient data processing and timely dissemination
- Balance study complexity with respondent burden
- Support flexibility in content and collection

CHIS and the RWG considered many different designs. Of particular interest to CHIS and the RWG was transitioning to address-based sampling (ABS) frames and the use of mixed-mode data collection.

Switching to ABS has huge potential for improving response rates while lowering survey costs (de Leeuw, 2005; Dillman et al., 2014; Hoebel et al., 2014; Harter et al., 2016) especially with the increased difficulty with contacting cell-phone only households (Lavrakas et al., 2017). The United States Postal Service (USPS) Computerized Delivery Sequence (CDS) file arguably has the best frame of households in the United States as it is regularly updated and has very high coverage, with coverage as high as 100% in some areas (Harter et al., 2016).

Many researchers are conducting mixed-mode designs with the ABS frame in an effort to alleviate high nonresponse and rising costs of RDD (de Leeuw, 2005; Johnson & Williams, 2010; Harter et al., 2016; de Leeuw, 2018; Olson et al., 2019). Mixed-mode designs can refer to different modes for data collection as well as for recruitment (Harter et al., 2016). The versatility of using different mode options at different stages of the survey process has proven to be effective.

Push-to-web (also known as web-push) methods has emerged in an effort improve response rates via the Internet (Battaglia et al., 2016; Dillman, 2017; Olson et al., 2019). This mixed-mode strategy uses a mail invitation to encourage (or "push") households to participate in a web survey. Web collection is generally considered the least expensive mode of data collection significantly reducing the cost per complete. The American Community Survey (ACS) adopted this strategy in 2013 and many countries – including Japan, Canada, Australia, and most recently the United States – have used web-push methods for recent censuses (Battaglia et al., 2016; Dillman, 2017). This method is being tested for a variety of surveys as a potential replacement for RDD CATI and/or in-person interviews across the world (Olson et al., 2019).

However, a push-to-web strategy alone may systematically exclude important groups in California. The internet penetration rate in California is around 84% meaning that a sizable proportion of the state population would not be covered by only offering a web response option. Internet access differs by age, race/ethnicity, and poverty status in the state based on estimates from CHIS 2015-2016 (see Table 1). Self-administered surveys in general have not proven as successful for non-English speakers and significantly underrepresent low English proficient respondents (e.g., McGovern, 2004; Brick et al., 2012; Caporaso et al., 2013; Newsome et al., 2017). In total, differences in coverage, education and literacy concerns as well as language barriers emphasize the need to continue offering (for example) telephone as a potential data collection mode.

While many mixed-mode studies will often include a paper-and-pencil questionnaire, the length, complexity (i.e., health insurance), and three individual surveys (adult, child, and adolescent) of CHIS currently make it difficult to implement.

Table 1. California internet access by age, race, and poverty status.

| | Internet Access |
|---|---|
| Statewide | 84.2% |

| Age | Internet Access | Race (OMB/CA DOF) | Internet Access | Federal Poverty Level (FPL) | Internet Access |
|---|---|---|---|---|---|
| 18-24 | 98.6% | Latino | 74.3% | 0-99% FPL | 68.2% |
| 25-39 | 94.4% | African American | 83.4% | 100-199% FPL | 74.3% |
| 40-64 | 82.8% | Asian | 86.5% | 200-299% FPL | 83.1% |
| 65-79 | 65.8% | White | 91.5% | 300% FPL and above | 94.0% |
| 80+ | 43.5% | Other | 90.8% | | |

Source: UCLA Center for Health Policy Research, California Health Interview Survey 2015-2016 (AskCHIS).
Note. OMB = Office of Management and Budget. CA DOF = California Department of Finance.

With the guidance of the RWG, CHIS decided on experimentally testing a data collection approach that best addressed the nine core redesign dimensions. The general design proposed was a mixed-mode survey design using an address-based sampling (ABS) frame with a mail push-to-web survey followed by a CATI nonresponse follow-up (NRFU).

***Spring Field Test***

CHIS received a combined grant from the Kaiser Permanente Northern California Community Benefits Program, the Kaiser Foundation Hospitals, Southern California Region, and the Kaiser Foundation Health Plan's National Program Offices. This grant included funding for a field experiment exploring a revised design for the CHIS that was less dependent on telephone data collection and would better position CHIS to efficiently collect accurate data in the current household survey environment in preparation for the 2019-2020 data collection cycle.

With input from the RWG, CHIS conducted an initial field test experiment between April and June of 2018. Three counties – Los Angeles, Santa Clara, and Tulare – were selected for the field test based on a variety of factors including CHIS response rates, American Community Survey (ACS) internet response rates, internet penetration rates, county size and urbanicity, geographic distribution across the state, and the relative Latino and Asian populations. This field test only offered an English web instrument, but CATI was available for all standard CHIS languages.

The spring feasibility test was generally a success showing improved response rates and lower data collection costs compared to classic CHIS telephone methods. In addition, multiple embedded experiments were included to test ways to ensure accurate within-household collection, increase completes on the third contact attempt, and improve adolescent collection. Full details of the field test and the associated experiments are available in Wells et al. (2018).

### *Fall Statewide Pilot*

While the spring field test proved the feasibility and potential of the new methods, it was ideal to test the ABS mixed-mode design across the entire state and improve on weaknesses observed in the first test. With support from the California Department of Health Care Services (DHCS), CHIS was able to conduct a statewide pilot aimed to collect 10% of the single year CHIS sample size between October 2018 and January 2019.

The pilot expanded the web instrument to include Spanish and continued to include CATI interviews in all CHIS languages. In addition to including a Spanish web instrument, high density Latino communities (i.e., Census blocks with at least 70% Latinos) were divided into two experimental conditions where one was mailed the standard English-prominent materials and the other was mailed Spanish-prominent materials (more details below). While the response rates were relatively identical for the two groups, the Spanish dominant materials resulted in slightly more Spanish completes.

Additional embedded experiments also tested methods to increase child completes, and improving adolescent collection. Weighted and unweighted estimates from the Fall pilot were also compared to 2017 production for some key indicators to preliminarily assess the impact of the new methods on survey estimates. Full details of the statewide pilot and the associated experiments are available in Wells et al. (2019). In short, the statewide pilot confirmed the successes of the feasibility test, saw improvements in in-language, child and adolescent completes, but also identified some areas in which the design continued to lag behind expectations.

## CHIS 2019 Design

With all of the experiments completed, the CHIS team was able to decide on a final design for the 2019-2020 cycle. CHIS 2019 data collection occurred between September and December 2019 for the adult and child surveys and October 2019 through January 2020 for the adolescent survey. In many respects, the 2019-2020 design greatly resembled the statewide pilot with a number of notable exceptions. The following sections discuss the overall sequence of contacts with respondents and alterations and improvements made to CHIS 2019.

### *Recruitment Strategy*

In general, the CHIS 2019 design used a sequence of three mailings to each selected household followed by a CATI follow-up. The sequence of mailings included an initial invitation letter, a sealed postcard reminder, and a final reminder letter. The first mailing contained the initial invitation letter, a $2 pre-incentive, a Frequently Asked Questions (FAQ) sheet, and a multilingual insert in all non-English CHIS languages. The invitation letter prominently featured who should complete the survey, the survey URL, and a secure access code unique to the household. In addition, a toll-free number was offered for those who wished to complete the

survey by phone. The multilingual letters in Spanish, Chinese, Vietnamese, Korean, and Tagalog contained the same information as the main letter with instructions on how to complete the survey in-language over the phone if needed.

The Spanish dominant language condition was maintained in CHIS 2019 to help increase the number of Spanish completes. The letters and FAQs for that condition were printed on an 11x17 sheet and folded as a booklet. In addition, the materials were printed and folded in a way so that the Spanish language materials would be displayed first upon opening the envelope. The envelopes also prominently featured Spanish on the front exterior, with the text reading, "Your health and opinion matter. Respond today." The initial contact also included multilingual letters in Chinese, Vietnamese, Korean, and Tagalog with instructions on how to complete the survey in-language over the phone if needed.

The second mailing was a pressure sealed postcard reminder sent to all sampled addresses. This invitation also included the survey URL and a secure access code unique to the household. Again, dominant language conditions were featured.

The third mailing was a letter with FAQ and was sent to households who had not yet responded, refused, or were designated as undeliverable. For most waves, this was sent using a United States Postal Service (USPS) Certified Mail® option. Certified mail requires a signature from the responding household when delivered. If no one is home, a delivery reminder slip is left in the mailbox by the letter carrier. This reminder informs the person a USPS Certified Mail® letter is being held at the local Post Office for pick-up. If no one picks up the letter after 5 to 7 days, USPS leaves a second delivery notice. Again, the delivery slip reminder is left by the letter carrier. Finally, after 5 to 7 days the final delivery attempt is made to the delivery address. After the final reminder is left the letter is taken back to the Post Office and held for 5 to 7 days prior to being returned to sender. The final wave in 2019 replaced the Certified mail with a standard First-class letter to help reduce burden during the holiday season.

Following delivery of the third mailing, interviewers attempted to complete a CATI interview with any remaining nonrespondents beginning about two weeks after mail out if a phone number was linked to the address (~68% of total addresses).

***Adjustments and Improvements***

In terms of adjustments and improvements to the statewide pilot design, CHIS made five major changes that implemented to improve collection in 2019.

*Expanded web language options.* Chinese, Korean, and Vietnamese web questionnaires were introduced in 2019 to better capture Asian language completes greatly underrepresented in the statewide pilot. Tagalog was excluded as a web option due to low usage in CHIS 2017-2018. For more details on the in-language completes, please refer to *CHIS 2019 Methodology Series: Report 2 – Data Collection Methods.*

*Predictive modeling for oversampling.* CHIS took advantage of recent developments in survey sampling to use Big Data and machine learning approaches to build predictive models of household attributes (e.g., Dutwin, 2018). By using ABS sample appended with auxiliary data (e.g., voting files, commercial consumer information, Census Planning Database) and then combining that with actual self-reported data from CHIS, we were able to develop models to predict self-reported survey outcomes to effectively target specific groups. In particular, CHIS targeted the following important or underrepresented groups: Asians (with particular emphasis on Korean and Vietnamese), Hispanic or Spanish-speakers, those with low educational attainment, non-citizens, and households with children under age 19. For more details on the predictive model methods and their relative success, please refer to *CHIS 2019 Methodology Series: Report 1 – Sample Design.*

*Expanded language dominant mailings*. In conjunction with the predictive models, the Spanish dominant mailings (detailed above) were included for households predicted as likely to include Hispanics or Spanish-speakers. In addition, CHIS introduced an Asian dominant mailing for households predicted to include Koreans, Vietnamese, or other Asians. This Asian dominant condition included a message on the back envelope in all six CHIS languages with Chinese, Korean, Vietnamese, and Tagalog at the top, with the text reading, "Your health and opinion matter. Respond today." On the multilingual insert for the Asian dominant condition, Spanish was moved to the end of the series putting Chinese, Korean, Vietnamese, and Tagalog first.

*Child survey ordering.* Following a child survey placement experiment in the statewide pilot (see Wells et al., 2019), CHIS moved the child survey between Section A and Section B of the adult survey in 2019. The statewide pilot results demonstrated great improvement in the number of child completes without a subsequent negative effect on adult completes when the child survey was placed in this manner. Section A was chosen because it contains a bulk of demographic data regarding the adult respondent including marital status and provided a logical transition into asking about their spouse/partner and rostering all of the children in the household which was originally placed in Section G. Consent to provide information about an eligible child was integrated into the adult consent language to streamline the consent procedure for the integrated adult and child surveys.

*Adolescent data collection.* Because the telephone hand-off could not be maintained with the new push-to-web design, the adolescent data collection experienced an expansive overhaul. Permission to survey the adolescent was obtained in Section G (about half way through the adult interview) as opposed to at the end of the adult survey to help improve permission rates. If the parent initially refused, they were re-asked with an offer to exclude questions on sensitive topics such as drugs and sexual behavior. Parents who agreed were asked for additional information about the adolescent including the best phone number for contact. Adolescents were offered a $10 gift card for completing the survey.

Once permission was received, a mailing was addressed to parent and a second envelope inside addressed to the adolescent. The letter to the parent thanked them for their permission to

speak with their adolescent and reiterated the key points of the adolescent's selection and participation. The letter to the adolescent prominently featured the survey URL and their individual access code, as well as detailing the promised incentive. This nested letter attempted to replicate the phone hand-off that was key to the high adolescent cooperation rate under the CATI design. A follow-up letter about a week after the initial packet was sent directly to the adolescent. If a telephone number was provided, CATI follow-up would occur with the adolescent ideally preceded by a text reminder, if it was their personal cell phone and the parent had provided permission for their adolescent to receive a text.

For households who did not grant permission, a parental permission refusal conversion letter was sent to the household. The letter offered an incentive to the parent for providing permission, and included the same nested letter to the adolescent if they decided to now grant permission for the adolescent to participate. An experiment tested differential amounts and timings of the parental incentive as part of the refusal conversion process and is discussed in *CHIS 2019 Methodology Series: Report 4 – Response Rates*.

**Total Survey Error Framework**

The investigation we engage in through this report is to observe the impact of changing sampling frame and survey modes on key estimates from CHIS, particularly as it relates to trends over time. However, changes due to the data collection mode are often confounded with other differences in survey administration. Thus it is important to discuss the possible sources of error we are likely to experience and observe.

In the total survey error (TSE) framework, we generally focus on two major classes of error: measurement and representation (Biemer & Lyberg, 2003; Groves et al., 2009). Measurement has to do with the questions and responses themselves. Representation has to do with the "who", as in who participates and how they compare to the population of interest.

***Measurement***

Measurement can be separated into three error sources: specification, measurement, and processing. As specification error has to do with the questions used to measure a concept, this is not a major concern for this evaluation as the nature of the CHIS question development has not changed. Similarly, processing error has to do with the way data is processed after collection which has not significantly changed following the redesign. Thus we are primarily concerned about measurement error which has many causes including the mode, the questionnaire, the respondent, and the interviewer (when applicable).

A word commonly used in this context is "mode effect." A mode effect by definition "refers to any influence on survey responses that is due to the mode of data collection" (Jans, 2008). Mode effect relates to measurement or the specific characteristics of a survey question as presented within that mode. Self-administered modes like pen-and-paper or web surveys are

primarily visual mediums while interviewer-administered like CATI or face-to-face (FTF) modes are primarily aural/verbal (though a FTF interview can allow for visual communication as well) (Krosnick & Alwin, 1987; Schwarz et al., 1991; Tourangeau et al., 2000). This means that the stimulus for each mode differs engaging different cognitive processes. For example, the presence of an interviewer in CATI or FTF can alter the behavior and responses of a respondent. Generally this is seen in more social desirable responding and satisficing. Self-administered modes are generally considered to allow for better self-reporting of sensitive or undesirable behaviors (Tourangeau et al., 2000; Tourangeau & Yan, 2007; Kreuter et al., 2008; Krumpal, 2013). Another dimension of mode effect has to do with serial-position effects (Krosnick & Alwin, 1987; Schwarz et al., 1991, 1992). Visual modes are generally susceptible to a primacy effect, or the tendency to favor the first response options presented. Aural stimulus in interviewer-administered modes generally have respondents relying on short-term or working memory which favors the last options presented, known as a recency effect.

One particular issue related to mode and measurement utilized in CHIS is that a CATI survey can utilize unread response options, generally those you anticipate from a small number of respondents but do not want to outright offer to the respondent. Unread or unseen options cannot be implemented in self-administered modes. Consider the question, “Has a doctor ever told you that you have high blood pressure?” This is classically considered a yes/no question. However, a respondent may have been told by their doctor that they have “borderline hypertension.” Cognitively, a respondent will make a decision whether to say “yes” because they consider a borderline status as an affirmative, or they could respond “no” because they know it is not an official diagnosis yet, or they could argue that their experience does not fit the question as presented and present a response not or provide no response. If the latter case occurred in an interviewer-administered survey, a respondent who responds, “My doctor told me I have pre-hypertension” could be recorded as “Pre-hypertension” assuming it is available as an unread option. In a self-administered mode, a simple yes/no response forces the respondent to make a decision. If you want to capture those who have borderline or pre-hypertension, you must explicitly provide it as a third option.

***Representation***

While we will make specific mention of differences in questions by mode, these changes are relatively rare looking at 2019. The larger issue is related to representation which is made up of four error sources: coverage, sampling, nonresponse, and adjustment.

The transition to ABS hopes to reduce coverage bias as discussed earlier. Sampling error is simply the recognition of data coming from a sample and not a census, especially in relation to variance estimation. Adjustment error is also not as critical for this analysis as it focuses on adjustments needed for weighting procedures due to sample design choices, which has remained relatively constant in recent years. While new oversampling techniques were implemented in CHIS 2019, oversampling has generally been utilized in previous CHIS cycles.

Nonresponse error and bias is the largest source of concern for representation for many surveys and is the most likely source of error in this survey design transition for CHIS. However, nonresponse is not solely, or even accurately, measured by a common indicator of survey quality: response rates. One might intuitively expect that high nonresponse rates means larger nonresponse bias, but that is not completely true. Multiple studies have demonstrated that nonresponse rates are only indirectly related to nonresponse bias and only represents the "risk" of nonresponse bias (e.g., Groves, 2006; Groves & Peytcheva, 2008; Kennedy & Hartig, 2019). Surveys can avoid much of this risk if the topics of the survey are not strongly related with the reasons to choose or refuse to participate in the survey (Groves & Peytcheva, 2008). Some have reported that recent election polls, for example, are more accurate, on average, than polls conducted 20 years ago, even with lower response rates (e.g., Kennedy & Hartig, 2019). Given increasing response rates is not a silver bullet, this means that surveys facing dangerously low levels of response need to consider how to ensure representation outside of response rates through proper questionnaire design, appropriate and effective survey design features like incentives and recruitment materials, etc. (Brick & Tourangeau, 2017).

Nonresponse due to the mode of contact and/or the mode of completion is primarily related to the concept of survey cooperation. This might mistakenly be called a "mode effect", when in reality it is related to how the survey is administered. By using a different mode, you may obtain cooperation from a different type of respondent. For example, access to and availability of a computer with internet can limit who can participate in a household web survey even if they are generally willing to participate. Conversely, persons who utilize call blocker technology or heavily screen calls through use of Caller ID may be less likely to respond to a telephone survey. Therefore, a respondent's comfort in or preference for a particular mode may influence them to participate (or not participate) in a survey. While the new methods may be at risk for nonresponse error due to mode, it must also be recognized that the historical methods may also have suffered from errors related to survey mode.

**A Word about Weighting**

While the raw sample data describes the "who" we talked to, surveys are often used to estimate population values. Weighting is used to correct imbalances between the final survey sample and the population. Weighting corrects for sampling for differential probabilities of selection, adjust for undercoverage, and reduces biases occurring due to nonresponse. A respondent's weight is roughly how many individuals that respondent represents in the sample from the population. Two different samples can produce similar estimates when weighted to the population using equivalent methods. This does not make weighting a magic statistical technique that can correct all biases from the survey process.

CHIS 2017-2018 was weighted to California's Department of Finance (DOF) population estimates, American Community Survey (ACS) population estimates, and Census 2010 population figures. These are usually restricted to dimensions around sex, age, race/ethnicity,

educational attainment, household size, and geography. CHIS 2019 was similarly weighted (for details see *CHIS 2017-2018 Methodology Series: Report 5 – Weighting and Variance Estimation* and *CHIS 2019 Methodology Series: Report 5 – Weighting and Variance Estimation)*.

An important change in the California DOF population estimates specific to 2019 is an increase in the number of Asians. This increase in the estimates is the result of a re-think of the international immigration model in recent years[1]. This shift is due to the improved ability to capture the origin and destination of international immigrants as well as the emigration behavior of individuals. This logic is consistent with the higher levels of immigration in the last decade compared to other race and ethnic groups in the last decade.

**Methods**

With the Fall statewide pilot taking place simultaneously with CHIS 2018 production, we have a reasonable transition estimate to help measure how much change in 2019 might come from actual changes over time compared to those related to the methodological changes of frame and mode.

A series of 38 adult, 17 child, and 16 adolescent demographic and substantive survey variables were selected for comparison (see Table 2). These variables were chosen to represent a broad range of topics including demographics, health conditions, health care access, health insurance, and socioeconomic metrics. Most variables selected had a universe of the full sample population and represented a variety of core and funder-supported content to ensure a broad variety of areas of interest. We do not include variables that had universes changes (i.e., changes in whom was asked the question) where we would expect substantial differences in trends, including questions related to public program which moved from <300% federal poverty level (FPL) to <200% FPL.

The preliminary analysis will look at sample composition differences between 2018 and 2019 primarily focusing on demographic variables used for weighting. We particularly focus on those variables used for weighting as the final weighted estimates for these demographic variables will ultimately match those provided by the California Department of Finance (DOF) and the American Community Survey (ACS). Within this analysis, we will look at and compare both unweighted and weighted estimates.

The main analysis focuses on the overall trends from CHIS 2015 through 2019. We begin at 2015, because this was the cycle CHIS transitioned to a 50/50 dual-frame RDD design (50% landline, 50% cell phone). This provides a relatively consistent overall design for the previous RDD CATI cycles[2]. Some exceptions are included for variables not, or differentially, collected in

[1] Based on email communication with California DOF staff.

[2] Some minor differences are observed in 2015-2018: 1) incentives for cell phone respondents in 2015-2016; 2) refusal conversion letters in 2015-2016; 3) out-of-state calling in 2017-2018; 4) advance letters with $2 pre-incentive to all households with a matched address in 2017 (typically only mailed to landline households with a

CHIS 2015-2016 (e.g., e-cigarette question fundamentally changed in between CHIS 2016 and CHIS 2017). The trend analyses also include estimates from the web experiment to provide needed context in understanding changes in the methodology[3]. Web experiment values are not included for the adolescent sample due to small sample sizes.

Looking only at the weighted estimates, we will primarily focus on substantive measures (e.g., health conditions, health care access, health insurance). In addition to statewide adult estimates, we will occasionally refer at specific adult subgroups to measure how differences in sample composition may be influencing trends over time. These subgroups include age, race/ethnicity, and poverty status, and are broken up as detailed below:

- Age group (5 groups): 18-24, 25-39, 40-64, 65-79, 80+
- Office of Management and Budget (OMB) race/ethnicity (5 groups): Latino, non-Latino white, non-Latino Asian, non-Latino African American, non-Latino other
- Poverty (4 groups): 0-138% FPL, 139-250% FPL, 251-400% FPL, 400% FPL and over

No subgroups are examined for the child and adolescent samples. While subgroup estimates and changes are discussed as needed in the report, no plots of subgroup comparisons are included, but can be found in the associated *Appendix: Adult Subgroup Trend Analysis*.

Statistically unstable estimates, as defined by a coefficient of variation greater than 30%, are denoted with an asterisk. No formal statistical tests between years are reported at this time.

matched address); and 5) oversample of American Indian/Alaska Natives (AIAN) statewide and non-Caucasians in San Francisco County in 2018.

[3] While CHIS production data is estimated with replicate weights, replicate weights were not produced for the Fall web experiment. Variance estimates, including confidence intervals, reported for the Fall web experiment are estimated using linearization.

Table 2. Variables of interest

| Adult | |
|---|---|
| Demographic | Age* |
| | Asian subgroups* |
| | Citizenship |
| | Country of birth |
| | English proficiency |
| | Family type |
| | Gender* |
| | Highest grade of education* |
| | Marital status |
| | Race (CHPR) |
| | Race (OMB)* |
| | Sexual orientation |
| | Transgender |
| Health behavior | Birth control (Male) |
| | Current smoker |
| | E-cigarette use |
| | Tried marijuana or hashish |
| Health care | Delay getting care |
| | Delay getting Rx |
| | Last dental visit |
| | Needed help for mental health |
| | Routine check-up in the past 12 mo. |
| | Usual source of care |
| | Visit counselor mental health/drugs |
| | Visit physician mental health/drugs |
| Health condition | Asthma |
| | BMI |
| | Diabetes |
| | Hypertension |
| | Self-rated health status |
| | Serious distress in the past month |
| | Suicide |
| Health insurance | Insurance type |
| Socioeconomic | Employment status |
| | Food security |
| | Housing tenure* |
| | People in neighborhood willing help |
| | Poverty status |

| Child | |
|---|---|
| Demographic | Age* |
| | Gender* |
| | Race (OMB)* |
| Health behavior | Five-a-day fruits/vegetables |
| Health care | Delay getting care |
| | Delay getting Rx |
| | Last dental visit |
| | Usual source of care |
| Health condition | Asthma |
| | Health status |
| | Overweight for age |
| Health insurance | Dental insurance |
| | Insurance type |
| Parental involvement | Days per week reading books |
| | Frequency singing songs |
| | Saw/heard 'Talk,Read,Sing' |
| Socioeconomic | Poverty status |

| Adolescent | |
|---|---|
| Demographic | Age* |
| | Gender* |
| | Gender expression |
| | Race (OMB)* |
| Health behavior | Current smoker |
| | Five-a-day fruits/vegetables |
| | Sedentary time on weekends |
| Health care | Delay getting Rx |
| | Delay getting care |
| | Usual source of care |
| Health condition | Asthma |
| | BMI |
| | Self-rated health status |
| | Serious distress in past mo. |
| Health insurance | Insurance type |
| Socioeconomic | Poverty status |

Note. * = weighting dimension

**Results**

As we seek to measure the impact of the new sample and data collection design, we first consider a high-level comparison of the previous and new methodologies. Table 3 shares some common quantitative metrics to compare the designs: the number of completes and response rates by survey age group. Though comparing a full two-year cycle and a single year is not directly equivalent, we can average the full cycle or double the single year sample to get a relative comparison. Of particular note is how the number of child and adolescent completes for CHIS 2019 almost matched the total child and adolescent completes for the entire previous two-year cycle. The adult and child surveys saw substantial increases in response rates. The adolescent response rate also increased somewhat.

When breaking down the adolescent response rate into its two components (permission and completion), we see that the permission rate more than doubled for CHIS 2019 going from 23.4% up to 52.8%, but the completion rate did go down somewhat from 74.5% to 52.5%. The loss of the telephone handoff characteristic of the CATI design does seem to have some impact on lower cooperation rate, though the higher permission rates ultimately results in more adolescents completing the survey.

Over 89% of the final adult sample completed on the Web with nearly 11% completing over the phone. Nearly half of those CATI completes were from inbound calls.

Considering adult completes by language, we do see a reduction in Spanish and Vietnamese completes from previous cycles (see Table 4). This reduction could possibly be tied to lower rates of literacy and education levels in these groups which would result in lower cooperation in self-administered modes (Lee et al., 2008; Ramirez et al., 2017). The number of Chinese and Korean completes remained consistent or improved from previous cycles.

Table 3. CHIS 2017-2018 and CHIS 2019 completes and response rates

| | | CHIS 2017-2018 | CHIS 2019 |
|---|---|---|---|
| Completes[1] | Adult | 42,330 | 22,160 |
| | Child | 3,186 | 3,009 |
| | Adolescent | 880 | 847 |
| Response Rates[2] | Adult | 3.4% | 10.8% |
| | Child | 58.3% | 86.1% |
| | Adolescent | 21.3% | 27.6% |
| Adolescent Permission Rate | | 23.4% | 52.8% |
| Adolescent Completion Rate[3] | | 74.5% | 52.5% |

Source: UCLA Center for Health Policy Research, California Health Interview Survey 2017-2019.

[1] As CHIS 2017-2018 reports completes for a two-year cycle and only one year for CHIS 2019-2020, one should either half the completes for CHIS 2017-2018 to compare or double the completes for CHIS 2019.

[2] Adult response rate is reported as an unconditional weighted response. The child and adolescent response rates are reported as conditional weighted response rates.

[3] Completion rate is calculated as Completes / Permission Given.

Table 4. CHIS 2017-2018 and CHIS 2019 completes by language

| | CHIS 2017-2018 | | CHIS 2019 | |
|---|---|---|---|---|
| Language | Completes | % of total | Completes | % of total |
| English | 38,818 | 91.70% | 21,131 | 95.36% |
| Spanish | 2,694 | 6.36% | 656 | 2.96% |
| Chinese | 299 | 0.71% | 209 | 0.94% |
| Korean | 233 | 0.55% | 123 | 0.56% |
| Vietnamese | 276 | 0.65% | 40 | 0.18% |
| Tagalog | 10 | 0.02% | 1 | 0.00% |
| Total[1] | 42,330 | | 22,160 | |

Source: UCLA Center for Health Policy Research, California Health Interview Survey 2017-2019.

[1] As CHIS 2017-2018 reports completes for a two-year cycle and only one year for CHIS 2019-2020, one should either half the completes for CHIS 2017-2018 to compare or double the completes for CHIS 2019.

### *Sample Composition Breakdown*

With the general positive results in mind, we transition our focus to a comparison of the sample composition across the redesign. For this breakdown, we focus on demographic characteristics that are used as weighting dimensions and are therefore designed to be consistent with population estimates from California DOF and ACS. Table 5 displays the frequencies, unweighted percentages, and weighted percentages for the six variables.

We begin with age. CHIS, like many population-based surveys, naturally oversamples older parts of the population due to their general availability and willingness to participate in survey research. CHIS 2017-2018 actually excluded 75% of listed sample likely to be households with persons aged 65+ to help increase the younger population in the final sample (see *CHIS 2017-2018 Methodology Series: Report 5 – Weighting and Variance Estimation*). However despite reductions in the aged 65+ sample given the web design, there is still large overrepresentation of those 65+ in the 2019 sample. We also continue to see underrepresentation of those less than 40 years old. While persons aged 18-39 are the most likely to have internet access, these households are also less likely to participate in survey research generally, especially those between 18 and 24 years old.

Females are also more likely to complete the survey and that difference increases with the new design going from 53.9% of the sample in 2018 to 55.8% in 2019.

As anticipated from the literature (see earlier discussion), we continue to underrepresent Hispanics in the final sample. While 2018 saw on par representation of African Americans, there was some underrepresentation observed consistent with the lower internet penetration rates discussed previously. While the percentage of American Indian and Alaska Natives (AIAN) seems smaller in 2019, this comparison does not account for the AIAN oversample conducted in 2018. With the change in the California DOF projections, the subsequent increase in Asian

interviews, particularly of Chinese and Filipinos (as seen in the Asian subgroup weighting dimension), is somewhat minimized as the overall weighted percentage as goes up.

Education potentially sees the largest changes under the new design. CHIS 2019 sees fewer without a high school diploma and many more college graduates. This shift makes sense as education is highly correlated with literacy.

The last direct weighting dimension we examine is housing tenure. CHIS 2019 obtained significantly more home owners than CHIS 2018 in the unweighted sample. It should be noted that this variable experiences a mode-related change in CHIS 2019 as "have other arrangement" was not originally presented as a response option to respondents on the telephone. While this did not seem to change the unweighted distribution, it may have had a small effect on the weighted percentage. This kind of mode-specific changes is discussed in greater detail in the following section.

Figure 1 displays the relative percentage point change[4] from the unweighted to the weighted percentages of the above variables showing the degree to which each response category is overestimated (above 0) or underestimated (below 0). A value of 1 denotes an unweighted percentage double the size of the weighted percentage while a value of -0.5 denotes an unweighted percentage half the size of the weighted percentage.

There is sufficient evidence to say that the new methodology produces a slightly different sample composition, better in some ways and worse in others.

[4] The relative difference is calculated as: $\frac{(x_{unweighted} - x_{weighted})}{x_{weighted}}$

Table 5. CHIS 2018 and 2019 sample composition by weighting variables

| | | CHIS 2018 | | | CHIS 2019 | | |
|---|---|---|---|---|---|---|---|
| | | Frequency | Unweighted | Weighted | Frequency | Unweighted | Weighted |
| Age | 18-24 | 1,812 | 8.56 | 13.72 | 800 | 3.61 | 13.91 |
| | 25-39 | 3,078 | 14.53 | 25.98 | 3,544 | 15.99 | 26.50 |
| | 40-64 | 8,129 | 38.39 | 41.08 | 9,309 | 42.01 | 40.09 |
| | 65-79 | 5,783 | 27.31 | 14.59 | 6,739 | 30.41 | 14.85 |
| | 80+ | 2,375 | 11.21 | 4.62 | 1,768 | 7.98 | 4.65 |
| Gender | Male | 9,754 | 46.06 | 48.83 | 9,785 | 44.16 | 48.79 |
| | Female | 11,423 | 53.94 | 51.17 | 12,375 | 55.84 | 51.21 |
| Race (OMB) | Hispanic | 4,709 | 22.24 | 36.10 | 4,044 | 18.25 | 36.13 |
| | Non-Hispanic White | 12,419 | 58.64 | 40.89 | 14,079 | 63.53 | 39.30 |
| | African American | 1,156 | 5.46 | 5.54 | 838 | 3.78 | 5.82 |
| | American Indian/Alaska native[2] | 351 | 1.66 | 0.44 | 101 | 0.46 | 0.49 |
| | Asian | 1,847 | 8.72 | 14.53 | 2,548 | 11.50 | 16.19 |
| | Native Hawaiian/Pacific Islander | 68 | 0.32 | 0.36 | 52 | 0.23 | 0.38 |
| | Two or more races | 627 | 2.96 | 2.13 | 498 | 2.25 | 1.69 |
| Asian subgroup[1] | Chinese | 630 | 2.97 | 5.28 | 770 | 3.47 | 4.53 |
| | Korean | 304 | 1.44 | 1.73 | 281 | 1.27 | 1.43 |
| | Filipino | 274 | 1.29 | 4.56 | 494 | 2.23 | 3.67 |
| | Vietnamese | 288 | 1.36 | 2.34 | 201 | 0.91 | 1.90 |
| | Japanese | 155 | 0.73 | 0.70 | 307 | 1.39 | 0.92 |
| Educational attainment | Less than high school | 1,718 | 8.11 | 16.44 | 795 | 3.59 | 14.53 |
| | High school diploma | 4,410 | 20.82 | 21.66 | 2,827 | 12.76 | 22.44 |
| | Some college | 5,995 | 28.31 | 22.98 | 6,642 | 29.97 | 22.82 |
| | College graduate | 9,054 | 42.75 | 38.92 | 11,896 | 53.68 | 40.21 |
| Housing tenure | Own home | 12,706 | 60.89 | 56.77 | 15,070 | 69.93 | 55.56 |
| | Rent home | 7,333 | 35.14 | 39.40 | 5,689 | 26.40 | 39.04 |
| | Some other arrangement | 828 | 3.97 | 3.84 | 792 | 3.68 | 5.40 |

Source: UCLA Center for Health Policy Research, California Health Interview Survey 2018-2019.

[1] Reporting self-reported Asian subgroups.

[2] CHIS 2018 included an oversample of AIAN households.

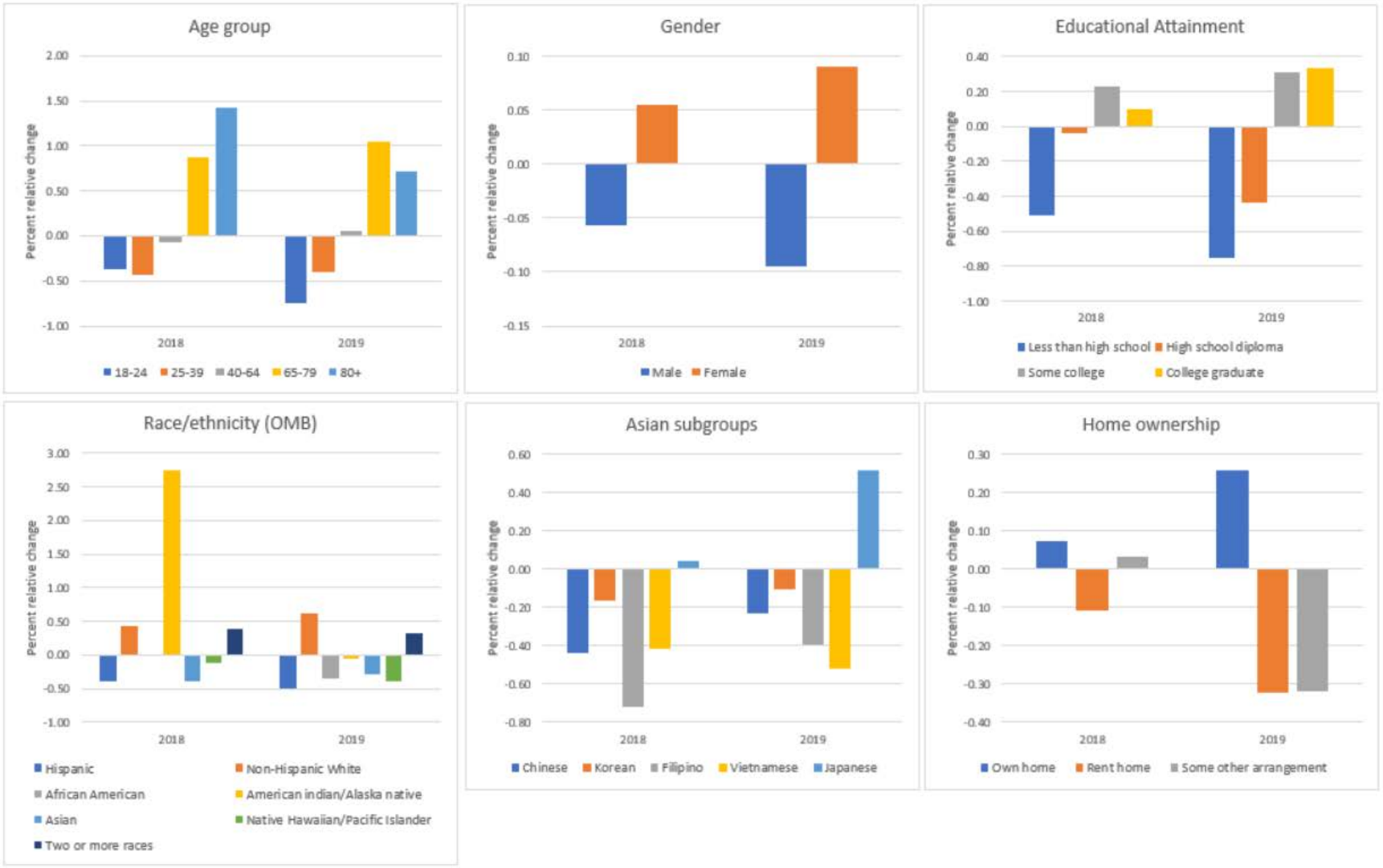



Figure 1. Percentage point relative change from unweighted percentage to weighted percentage for CHIS 2018 and 2019 weighting variables. CHIS 2018 included an oversample of AIAN households.

### *Adult Trend Analysis: 2015-2019*

With the understanding of the shifting demographic profile from the RDD CATI methods to the ABS web methods, we focus on the trends for the remaining variables. For each variable, we share the trend from CHIS 2015 through 2019 for everyone 18+ years old unless otherwise specified. In addition, we include the preliminary estimates from the Fall web experiment in an attempt to add context to any transitions. However, it should be noted at the onset that there are multiple instances where the Fall web experiment point estimates were quite different from both 2018 and 2019. Given some of the previously noted limitations of that sample which resulted in changes to the 2019 design (e.g., minimal non-English completes leading to the expansion of Asian language web instruments and introduction of Asian dominant mailings), we can see that these revisions to the design helped to correct many estimates.

All reported changes denote non-overlapping confidence intervals between 2018 and 2019 unless otherwise specified.[5]

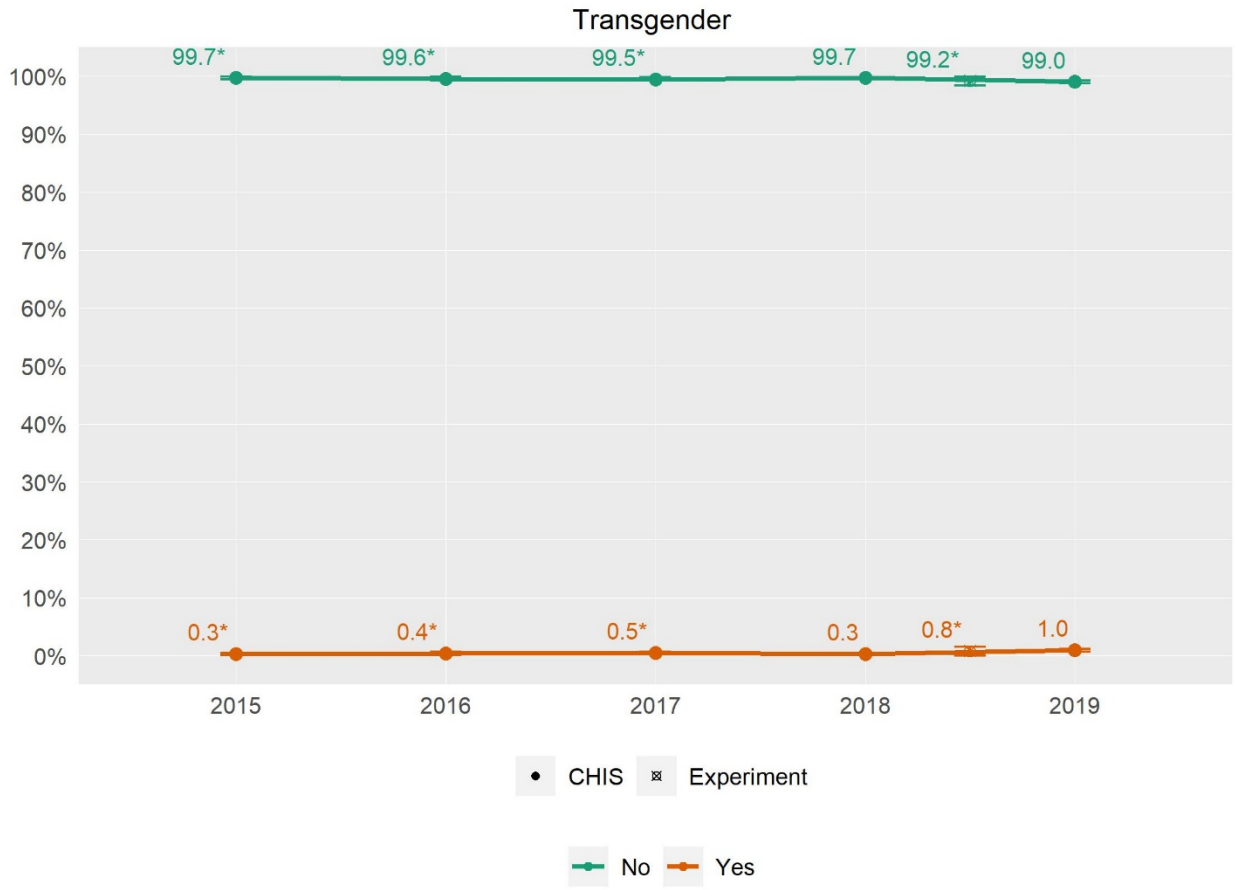
Given the dynamic nature of the questionnaire and the necessity to adapt to a new data collection mode, we divide this section based on some known characteristics. We begin with variables where we expected there to be observed differences, specifically those that underwent adaptation for self-administration. We then discuss the remaining variables by content area in an order generally corresponding with their placement in the questionnaire: demographics, health conditions, health behaviors, health insurance, health care, and socioeconomic.

*Mode-specific changes*

We begin with those question-related adjustments required by the change in mode. This primarily is made up of presenting response options previously unread. This includes the current gender identity question (“none of these”), sexual orientation (“none of these”), birth control (“no male/female sex partner”), and hypertension (“borderline or pre-hypertension”). As mentioned previously, the weighting dimension of housing tenure also had an unread response option for “have other arrangement” in previous cycles, but is not discussed here, except to say that data products like AskCHIS have long reported “have other arrangement” and given minimal changes to the distribution can generally be trended across cycles.

[5] In consultation with sampling and weighting experts, CHIS changed the jackknife coefficient for variance estimation in 2019 from 0.999 to 0.5 to more accurately reflect the current weighting design. This change will result in smaller variances for some variables in 2019 than previous cycles.

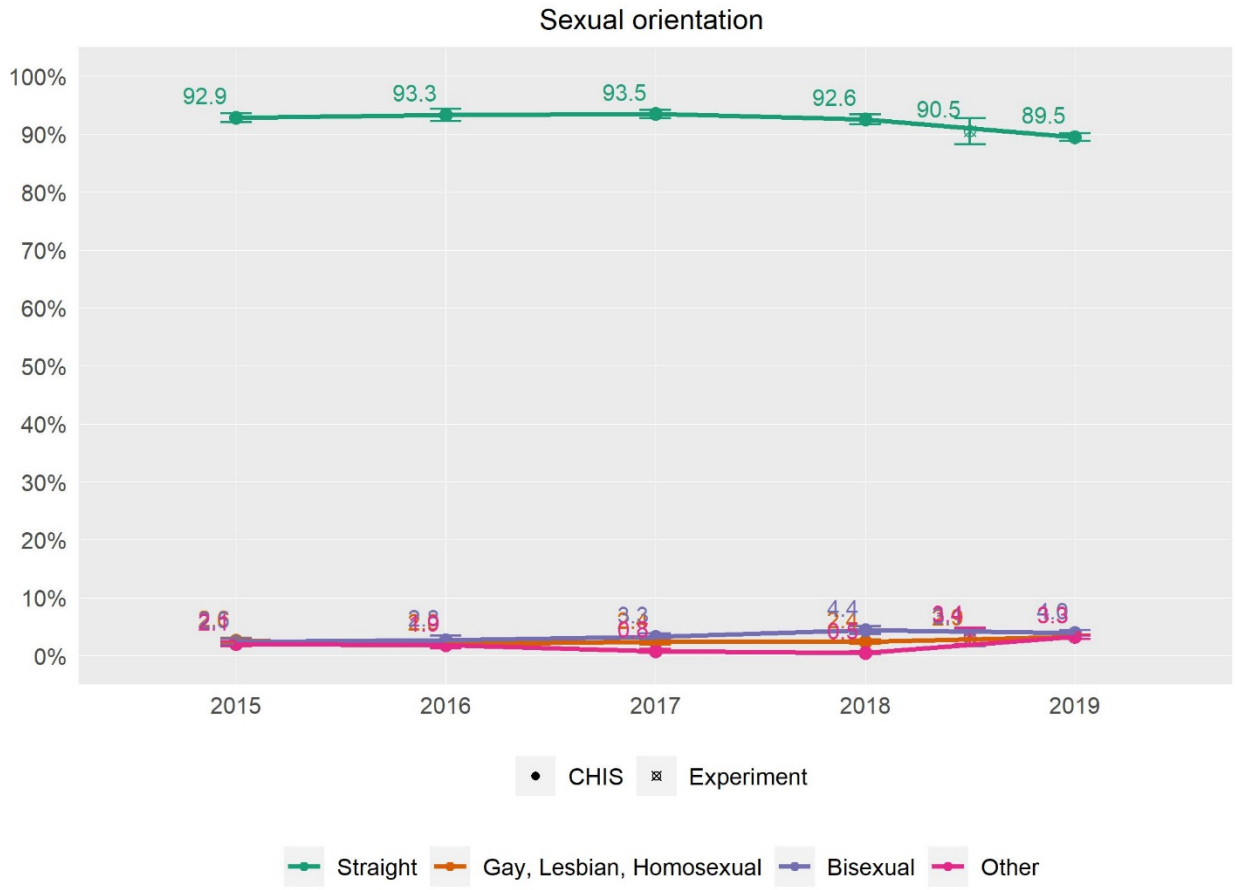
Given the explicit inclusion of the “none of these” category in the current gender identity question, we see a large uptick in are estimate of transgender or gender non-conforming persons, about 0.3% in 2018 up to 1.0% in 2019. Further investigation shows that this is directly due to an increase in “none of these” responses with corresponding other specify responses like “genderfluid” and “nonbinary”.




| Transgender or gender non-conforming | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| No | 99.7* | 99.6* | 99.5* | 99.7 | 99.0 | 99.2* |
| | (99.5, 99.9) | (99.3, 99.9) | (99.3, 99.8) | (99.5, 99.8) | (98.8, 99.3) | (98.4, 99.9) |
| Yes | 0.3* | 0.4* | 0.5* | 0.3 | 1.0 | 0.8* |
| | (0.1, 0.5) | (0.1, 0.7) | (0.2, 0.7) | (0.2, 0.5) | (0.7, 1.2) | (0.1, 1.6) |

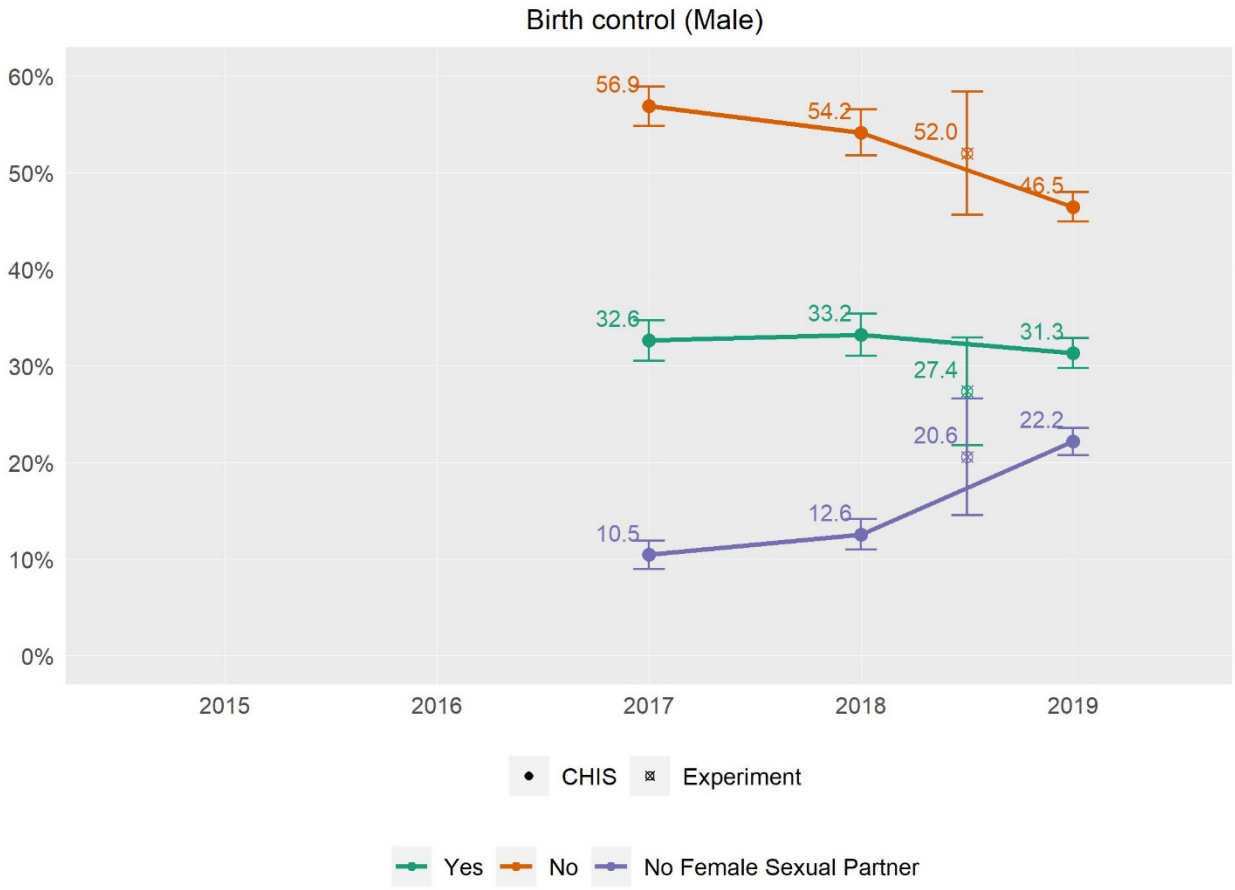
Note. * = statistically unstable.

Similarly for sexual orientation, the CATI wording only specified “straight/heterosexual”, “gay/lesbian/homosexual”, and “bisexual” as response options. While CHIS 2015-2016 saw slightly higher rates of “other” responses (~2.0%) compared to CHIS 2017-2018 (~0.67%), the estimate of CHIS 2019 is higher than even 2015-2016 at 3.3%. In addition, we see an uptick in those reporting as “gay/lesbian/homosexual” from 2.4% to 3.3% and a resulting drop in “straight/heterosexual” from 92.6% down to 89.5%.



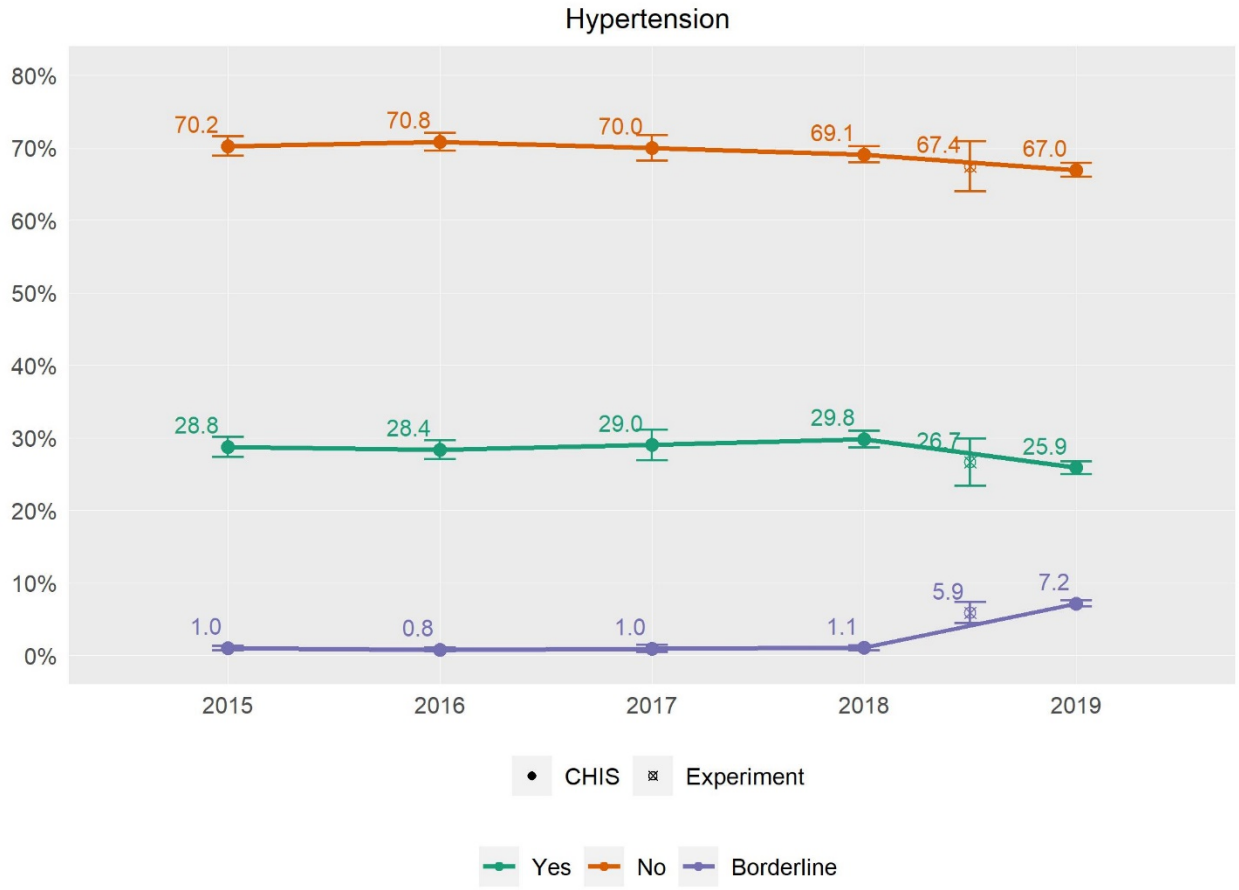

| Sexual orientation | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| Straight | 92.9 (92.1, 93.6) | 93.3 (92.3, 94.4) | 93.5 (92.8, 94.2) | 92.6 (91.7, 93.5) | 89.5 (88.9, 90.2) | 90.5 (88.3, 92.8) |
| Gay/Lesbian/ Homosexual | 2.6 (2.1, 3.1) | 2.0 (1.6, 2.4) | 2.4 (1.9, 2.8) | 2.4 (2.1, 2.8) | 3.3 (2.9, 3.6) | 2.9 (1.7, 4.1) |
| Bisexual | 2.5 (2.0, 3.0) | 2.8 (2.0, 3.5) | 3.3 (2.8, 3.9) | 4.4 (3.8, 5.1) | 4.0 (3.5, 4.4) | 3.1 (1.6, 4.5) |
| Other | 2.1 (1.6, 2.5) | 1.9 (1.3, 2.5) | 0.8 (0.5, 1.1) | 0.5 (0.3, 0.8) | 3.3 (2.9, 3.6) | 3.4 (2.1, 4.8) |

For male birth control, there is a large increase in responses to “no female sexual partner” from 12.6% in 2019 up to 22.2% in 2019. We can see the direct reduction from no birth control used suggesting that previous respondents provided “no” as a verbal response when they had no female sexual partner. Thus, it is recommendation of this author that this be considered a break in trend. The birth control variable for females is not examined here, because of a universe change from 2018 to 2019 from ages 18-49 to ages 18-44.




| Birth control (male) | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|
| Yes | 32.6 | 33.2 | 31.3 | 27.4 |
| | (30.5, 34.8) | (31.1, 35.4) | (29.8, 32.9) | (21.8, 33.0) |
| No | 56.9 | 54.2 | 46.5 | 52.0 |
| | (54.9, 58.9) | (51.8, 56.6) | (44.9, 48.0) | (45.6, 58.4) |
| No Female Sexual Partner | 10.5 | 12.6 | 22.2 | 20.6 |
| | (9.0, 11.9) | (11.0, 14.1) | (20.8, 23.6) | (14.6, 26.6) |

Hypertension presents an interesting change illuminating the cognitive difficulties respondents face in the interviewer-administered mode. We saw that the percentage of those reporting their doctor telling them they have “borderline or pre-hypertension” increases from a historical 1.0% up to 7.2% in 2019. We see decreases in both “yes” and “no” responses potentially suggesting that many pre-hypertension respondents may have chosen “yes” because they considered the diagnosis equivalent while some responded “no” feeling it was not completely accurate. The previous decision to group “no” and “borderline or pre-hypertension” will result in significantly lower rates of hypertension in this and future cycles. Thus it is recommendation of this author that “borderline or pre-hypertension” be treated independently from the “yes” and “no” categories beginning with 2019.

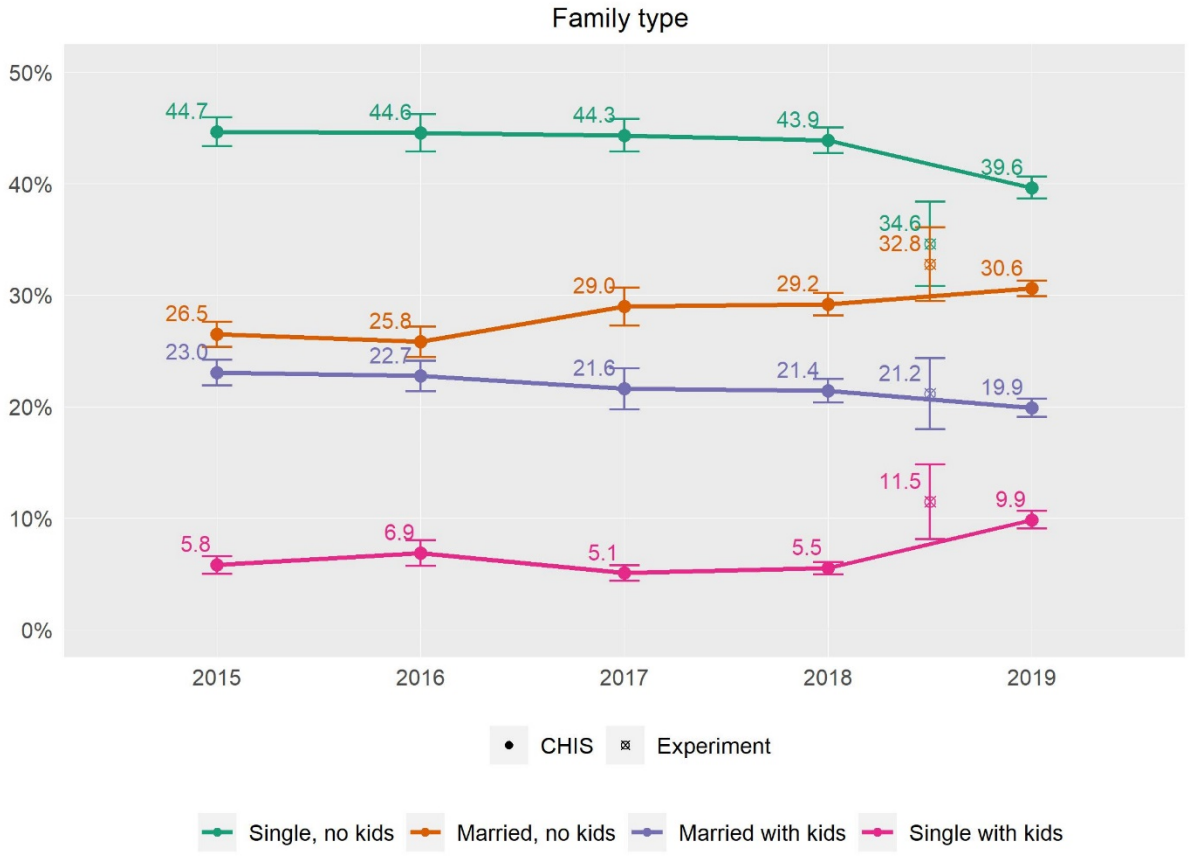



| Hypertension | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| Yes | 28.8 | 28.4 | 29.0 | 29.8 | 25.9 | 26.7 |
| | (27.4, 30.1) | (27.1, 29.7) | (27.0, 31.1) | (28.7, 31.0) | (25.0, 26.8) | (23.4, 29.9) |
| No | 70.2 | 70.8 | 70.0 | 69.1 | 67.0 | 67.4 |
| | (68.9, 71.6) | (69.6, 72.0) | (68.2, 71.8) | (68.0, 70.2) | (66.0, 67.9) | (64.0, 70.9) |
| Borderline | 1.0 | 0.8 | 1.0 | 1.1 | 7.2 | 5.9 |
| | (0.7, 1.3) | (0.6, 1.1) | (0.5, 1.5) | (0.7, 1.4) | (6.7, 7.6) | (4.5, 7.3) |

With the major construct and wording changes covered, we now move on to the more difficult task of determining what variables remained stable measurement-wise from the old to the new methods. We discuss the remaining content by topic area.

*Demographics*

First, we consider demographic characteristics. Given age, gender, race/ethnicity (as defined by California DOF and the American Community Survey), and education are part of the weighting variables, these are guaranteed to match population estimates and are thus not discussed here. We begin with family type which see shifts increasing the number of single adult households with children (5.5% to 9.9%) and decreasing those without (43.9% to 39.6%). While this could be reflective of the oversampling of households with children as part of the predictive modeling, the web experiment values are consistent in the directional change observed suggesting an overall difference due to the methodological changes.

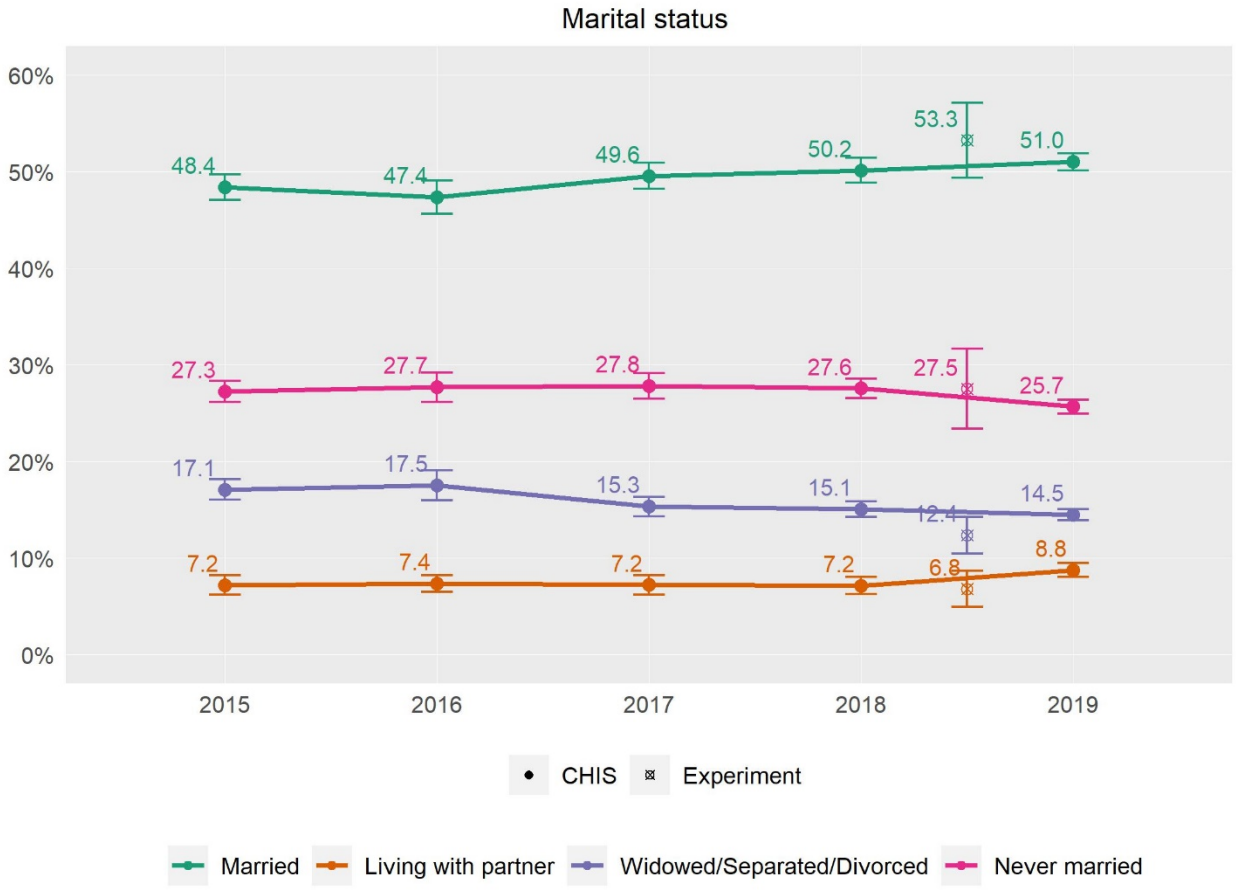



| Family type | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| Married with kids | 23.0 | 22.7 | 21.6 | 21.4 | 19.9 | 21.2 |
| | (21.9, 24.2) | (21.4, 24.1) | (19.8, 23.5) | (20.4, 22.5) | (19.1, 20.7) | (18.0, 24.3) |
| Married, no kids | 26.5 | 25.8 | 29.0 | 29.2 | 30.6 | 32.8 |
| | (25.4, 27.6) | (24.5, 27.2) | (27.3, 30.7) | (28.2, 30.2) | (29.9, 31.3) | (29.5, 36.1) |

(continued)

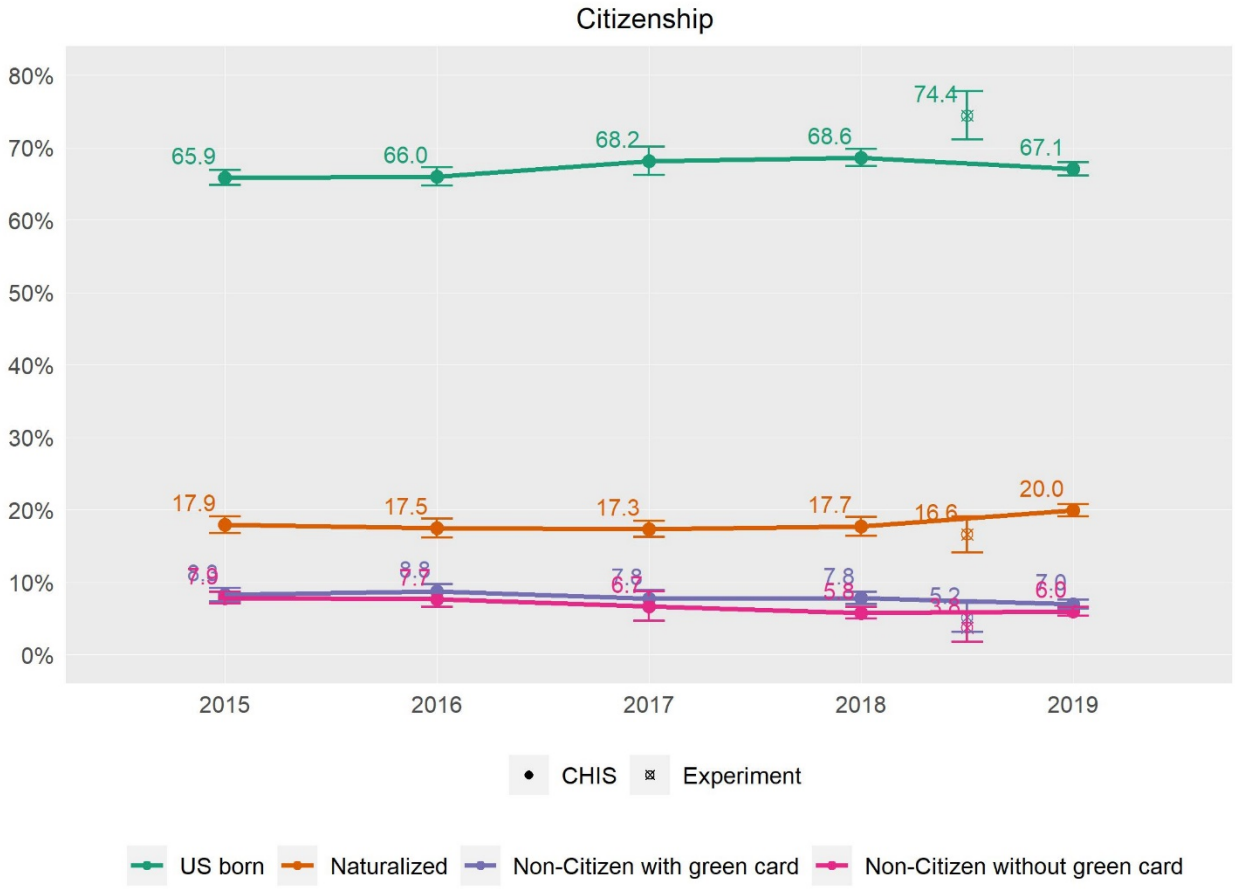
| | | | | | | |
|---|---|---|---|---|---|---|
| Single with kids | 5.8 (5.0, 6.6) | 6.9 (5.7, 8.0) | 5.1 (4.4, 5.8) | 5.5 (5.0, 6.1) | 9.9 (9.1, 10.6) | 11.5 (8.1, 14.8) |
| Single, no kids | 44.7 (43.4, 46.0) | 44.6 (42.9, 46.2) | 44.3 (42.9, 45.8) | 43.9 (42.7, 45.0) | 39.6 (38.6, 40.6) | 34.6 (30.8, 38.4) |

Next we look at marital status. We see a significant drop in those never married with significant increase living with a partner. This shift may be somewhat related to the difficulty in obtaining younger respondents.



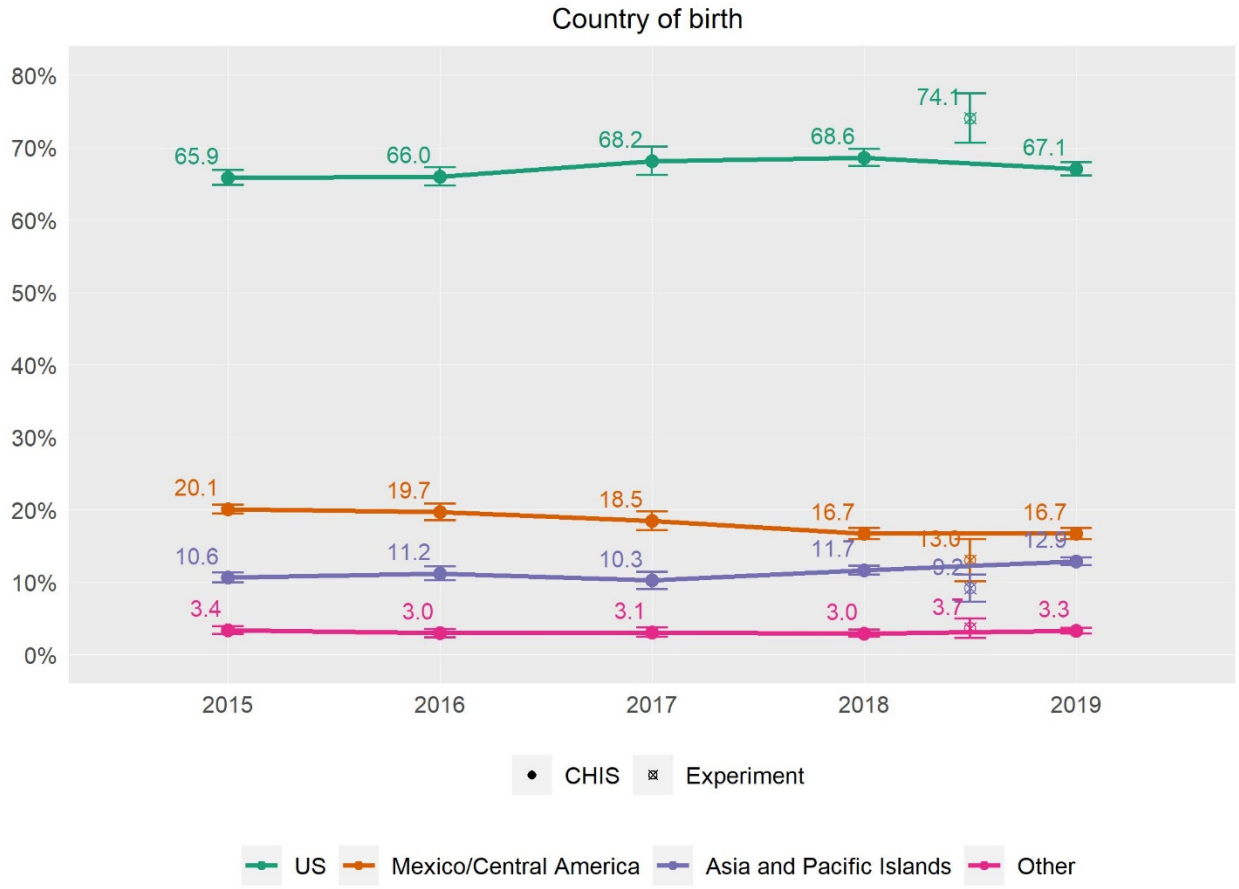

| Marital status | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| Married | 48.4 (47.1, 49.7) | 47.4 (45.7, 49.1) | 49.6 (48.2, 50.9) | 50.2 (48.9, 51.4) | 51.0 (50.2, 51.9) | 53.3 (49.4, 57.2) |
| Living with partner | 7.2 (6.2, 8.2) | 7.4 (6.5, 8.2) | 7.2 (6.2, 8.2) | 7.2 (6.3, 8.1) | 8.8 (8.1, 9.5) | 6.8 (5.0, 8.7) |
| Widowed/Separated/ Divorced | 17.1 (16.0, 18.2) | 17.5 (16.0, 19.1) | 15.3 (14.3, 16.4) | 15.1 (14.3, 15.9) | 14.5 (13.9, 15.1) | 12.4 (10.5, 14.3) |
| Never married | 27.3 (26.1, 28.4) | 27.7 (26.2, 29.2) | 27.8 (26.5, 29.2) | 27.6 (26.6, 28.6) | 25.7 (25.0, 26.4) | 27.5 (23.4, 31.7) |

Next we consider citizenship status. While there is a small differences observed with the percent of naturalized citizens, the confidence intervals for 2018 and 2019 intersect suggesting a degree of consistency between previous cycles and CHIS 2019.




| Citizenship | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| US born | 65.9 (64.8, 67.0) | 66.0 (64.8, 67.3) | 68.2 (66.2, 70.1) | 68.6 (67.5, 69.8) | 67.1 (66.1, 68.0) | 74.4 (71.1, 77.8) |
| Naturalized | 17.9 (16.8, 19.1) | 17.5 (16.2, 18.8) | 17.3 (16.2, 18.5) | 17.7 (16.4, 19.1) | 20.0 (19.1, 20.8) | 16.6 (14.2, 19.1) |
| Non-Citizen w/ green card | 8.3 (7.4, 9.2) | 8.8 (7.8, 9.7) | 7.8 (6.6, 8.9) | 7.8 (7.0, 8.6) | 7.0 (6.3, 7.6) | 5.2 (3.2, 7.2) |
| Non-Citizen w/o green card | 7.9 (7.1, 8.7) | 7.7 (6.6, 8.8) | 6.7 (4.7, 8.7) | 5.8 (5.0, 6.6) | 6.0 (5.4, 6.6) | 3.8 (1.8, 5.7) |

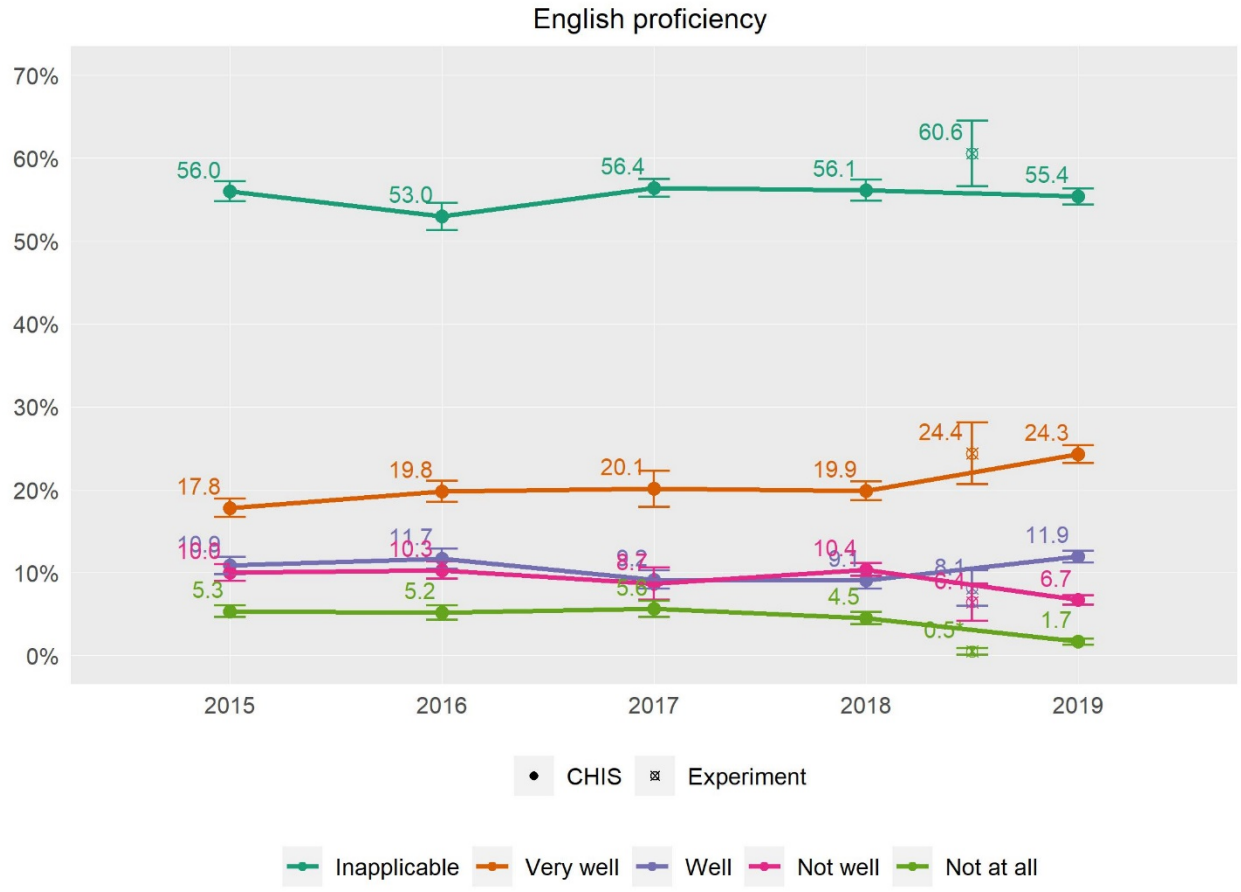
Regarding country of birth[6], we note increases from Asian and Pacific Island countries. This corresponds to the shifting immigration patterns reflected in the California DOF estimates used for CHIS 2019 (for more details see the above section, *A Word About Weighting*).




| Country of birth | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| United States | 65.9 (64.8, 67.0) | 66.0 (64.8, 67.3) | 68.2 (66.2, 70.1) | 68.6 (67.5, 69.8) | 67.1 (66.1, 68.0) | 74.1 (70.7, 77.5) |
| Mexico/ Central America | 20.1 (19.4, 20.7) | 19.7 (18.6, 20.9) | 18.5 (17.2, 19.8) | 16.7 (15.9, 17.5) | 16.7 (16.0, 17.5) | 13.0 (10.2, 15.9) |
| Asia and Pacific Islands | 10.6 (9.9, 11.3) | 11.2 (10.3, 12.2) | 10.3 (9.1, 11.5) | 11.7 (11.0, 12.3) | 12.9 (12.4, 13.4) | 9.2 (7.3, 11.1) |
| Other | 3.4 (2.9, 3.9) | 3.0 (2.4, 3.5) | 3.1 (2.4, 3.7) | 3.0 (2.5, 3.5) | 3.3 (2.9, 3.7) | 3.7 (2.3, 5.0) |

[6] The web presentation for the country of birth question (AH33) allowed for substantial improvements in coding to regions. A new country of birth variable (CNTRYS2) will be available for CHIS 2019 to provide better, more specific geographic coding and will eventually replace CNTRYS.

English proficiency does see noticeable differences from previous cycles. The increase in those speaking English "very well" or "well" is partly due to the decrease in non-English language interviews and that self-administered modes bring in more highly educated persons who are more likely to be speak some English.

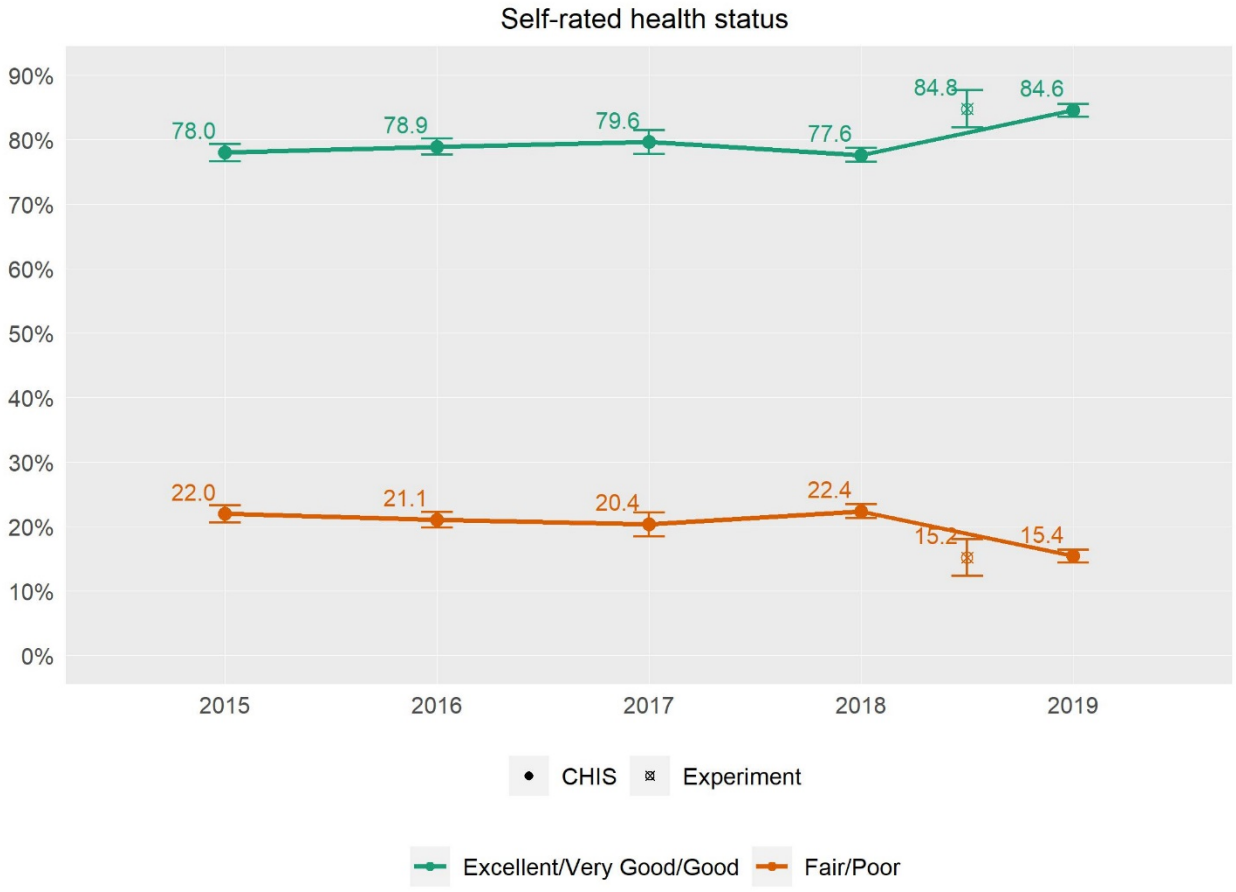



| English Proficiency | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| Inapplicable | 56.0 (54.8, 57.2) | 53.0 (51.3, 54.6) | 56.4 (55.3, 57.5) | 56.1 (54.9, 57.4) | 55.4 (54.4, 56.4) | 60.6 (56.6, 64.5) |
| Very well | 17.8 (16.7, 18.9) | 19.8 (18.5, 21.1) | 20.1 (17.9, 22.3) | 19.9 (18.7, 21.0) | 24.3 (23.2, 25.3) | 24.4 (20.6, 28.1) |
| Well | 10.9 (9.8, 11.9) | 11.7 (10.5, 12.9) | 9.2 (8.0, 10.3) | 9.1 (8.1, 10.1) | 11.9 (11.2, 12.7) | 8.1 (6.0, 10.3) |
| Not well | 10.0 (9.0, 11.0) | 10.3 (9.2, 11.3) | 8.7 (6.7, 10.6) | 10.4 (9.6, 11.2) | 6.7 (6.1, 7.3) | 6.4 (4.2, 8.7) |
| Not at all | 5.3 (4.6, 6.0) | 5.2 (4.3, 6.1) | 5.6 (4.6, 6.6) | 4.5 (3.8, 5.3) | 1.7 (1.3, 2.1) | 0.5* (0.1, 0.9) |

Note. * = statistically unstable.

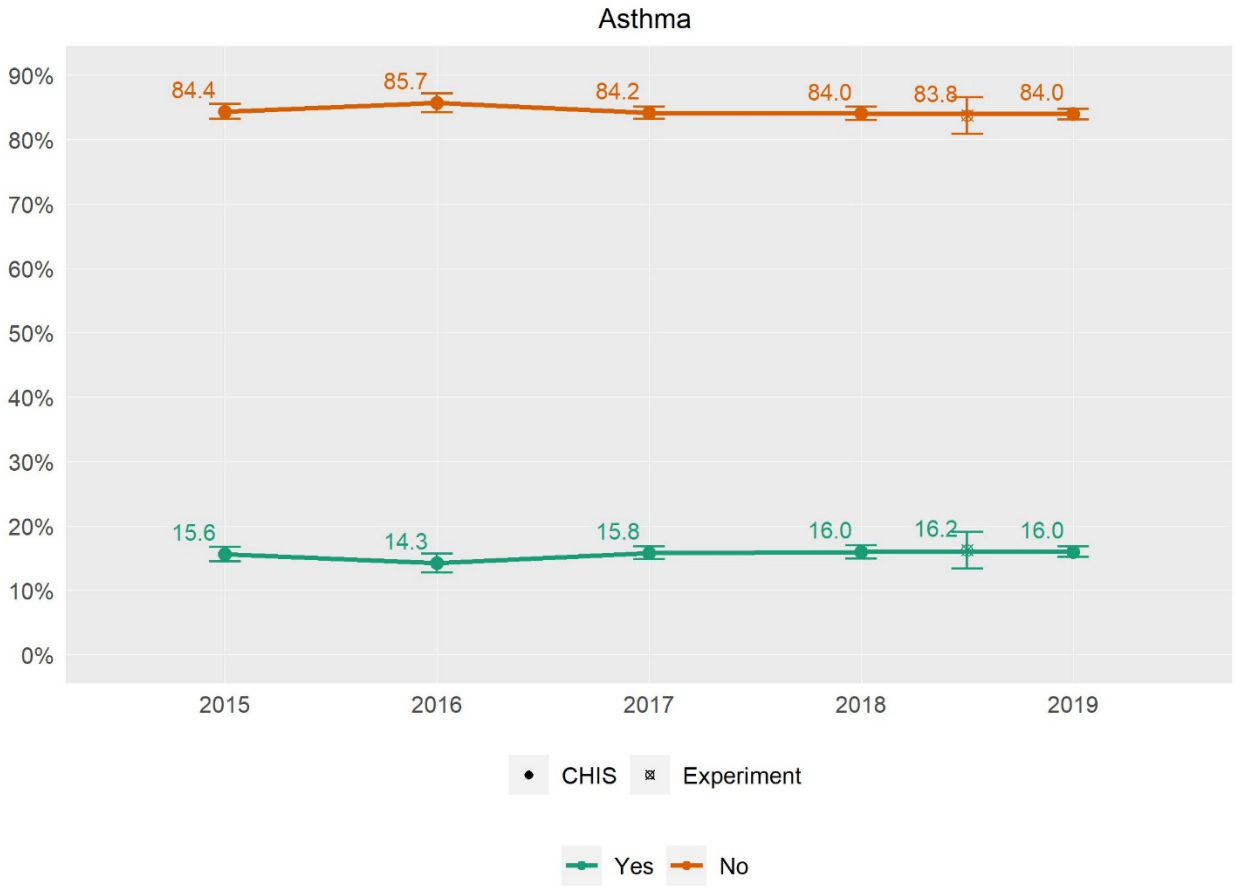
*Health conditions*

Next, we move on to health conditions. We begin with self-rated health (SRH) which has a noticeable increase those classified as excellent, very good, or good, particularly for the two highest categories. SRH being higher on web compared to other modes is consistent with previous research (e.g., Shim, Shin, & Johnson, 2013) and may be somewhat related to a potential primacy effect (Garbarski, Schaeffer, & Dykema, 2015). With the decrease in Spanish language interviews, which has been shown to have lower (Lee & Grant, 2009; Lee & Schwarz, 2014), due to a potential lack of cross-cultural validity (Lee, 2014).

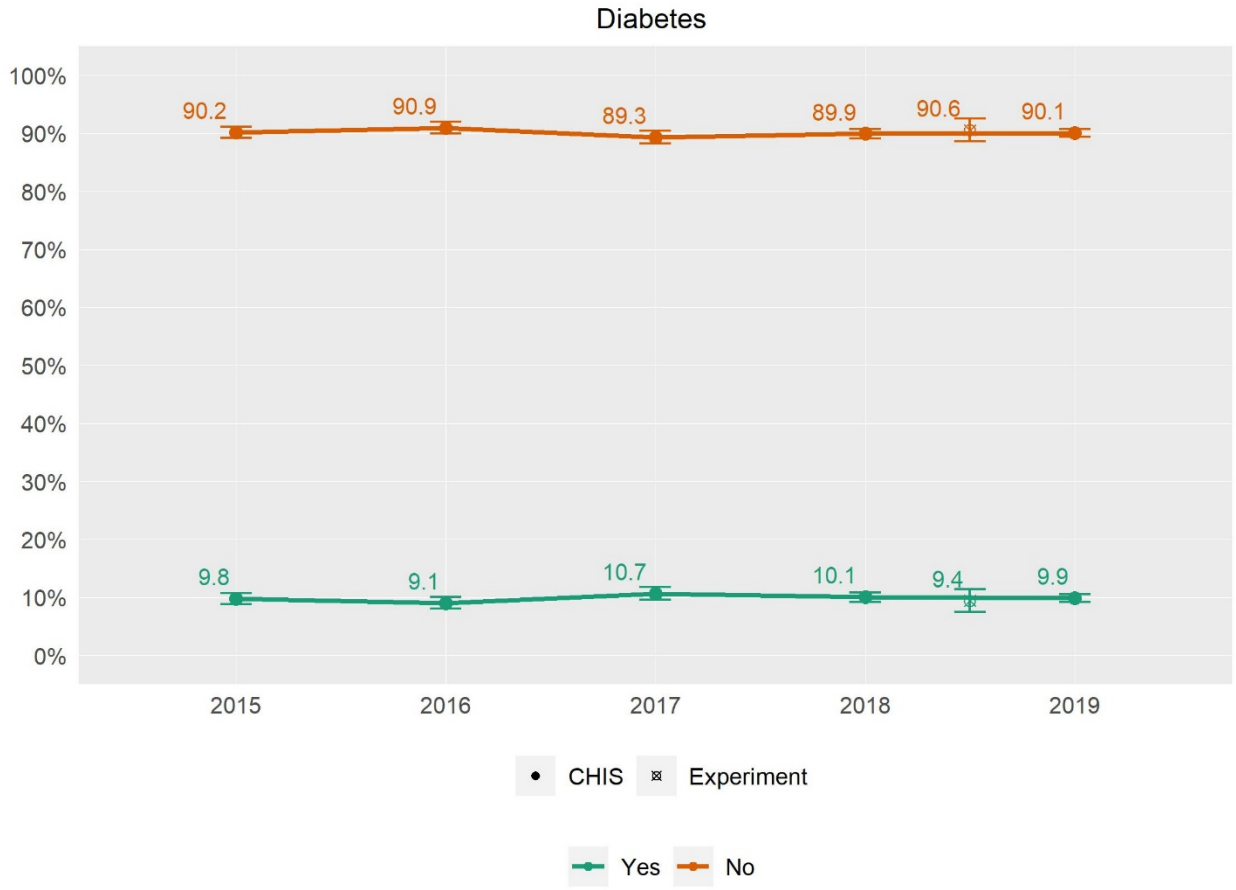



| Self-rated health | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| Excellent/ Very Good/Good | 78.0 (76.7, 79.4) | 78.9 (77.7, 80.2) | 79.6 (77.8, 81.5) | 77.6 (76.5, 78.7) | 84.6 (83.6, 85.6) | 84.8 (81.9, 87.7) |
| Fair/Poor | 22.0 (20.6, 23.3) | 21.1 (19.8, 22.3) | 20.4 (18.5, 22.2) | 22.4 (21.3, 23.5) | 15.4 (14.4, 16.4) | 15.2 (12.3, 18.1) |

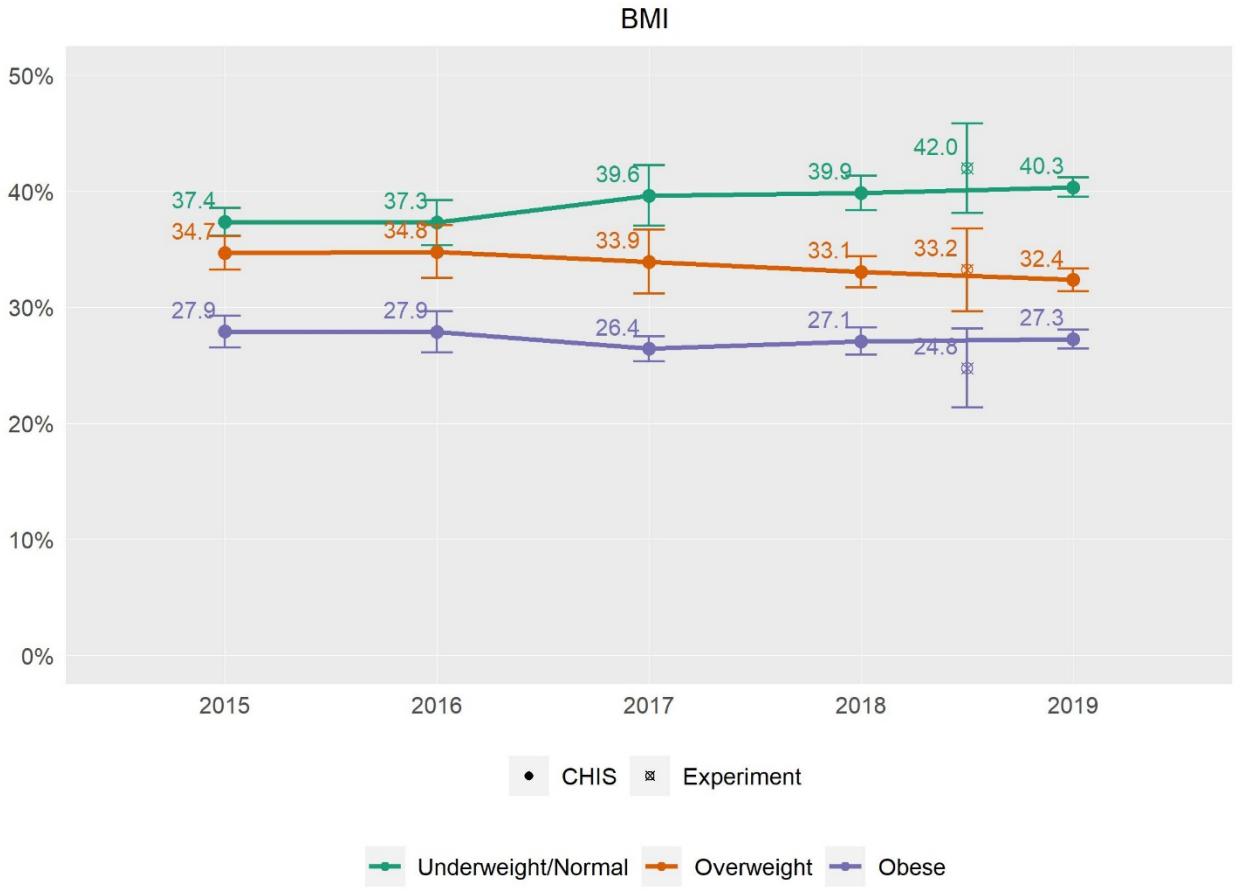
Ever diagnosed with asthma, ever diagnosed with diabetes, and body mass index (BMI) all look consistent with previous trends.




| Asthma | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| No | 84.4 (83.2, 85.5) | 85.7 (84.3, 87.2) | 84.2 (83.2, 85.1) | 84.0 (83.0, 85.1) | 84.0 (83.2, 84.8) | 83.8 (80.9, 86.6) |
| Yes | 15.6 (14.5, 16.8) | 14.3 (12.8, 15.7) | 15.8 (14.9, 16.8) | 16.0 (14.9, 17.0) | 16.0 (15.2, 16.8) | 16.2 (13.4, 19.1) |

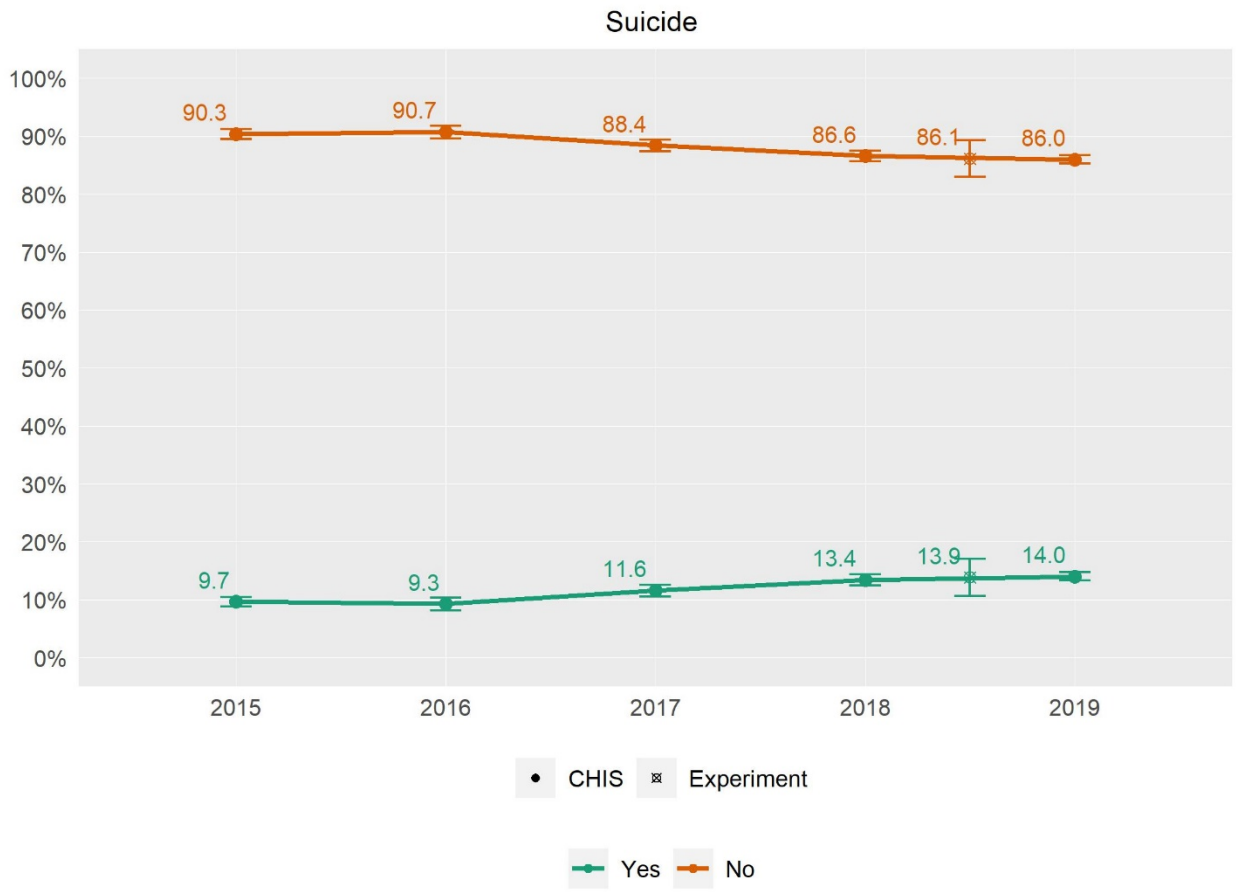



| Diabetes | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| No | 90.2 (89.2, 91.1) | 90.9 (89.9, 91.9) | 89.3 (88.2, 90.4) | 89.9 (89.1, 90.7) | 90.1 (89.4, 90.7) | 90.6 (88.6, 92.5) |
| Yes | 9.8 (8.9, 10.8) | 9.1 (8.1, 10.1) | 10.7 (9.6, 11.8) | 10.1 (9.3, 10.9) | 9.9 (9.3, 10.6) | 9.4 (7.5, 11.4) |



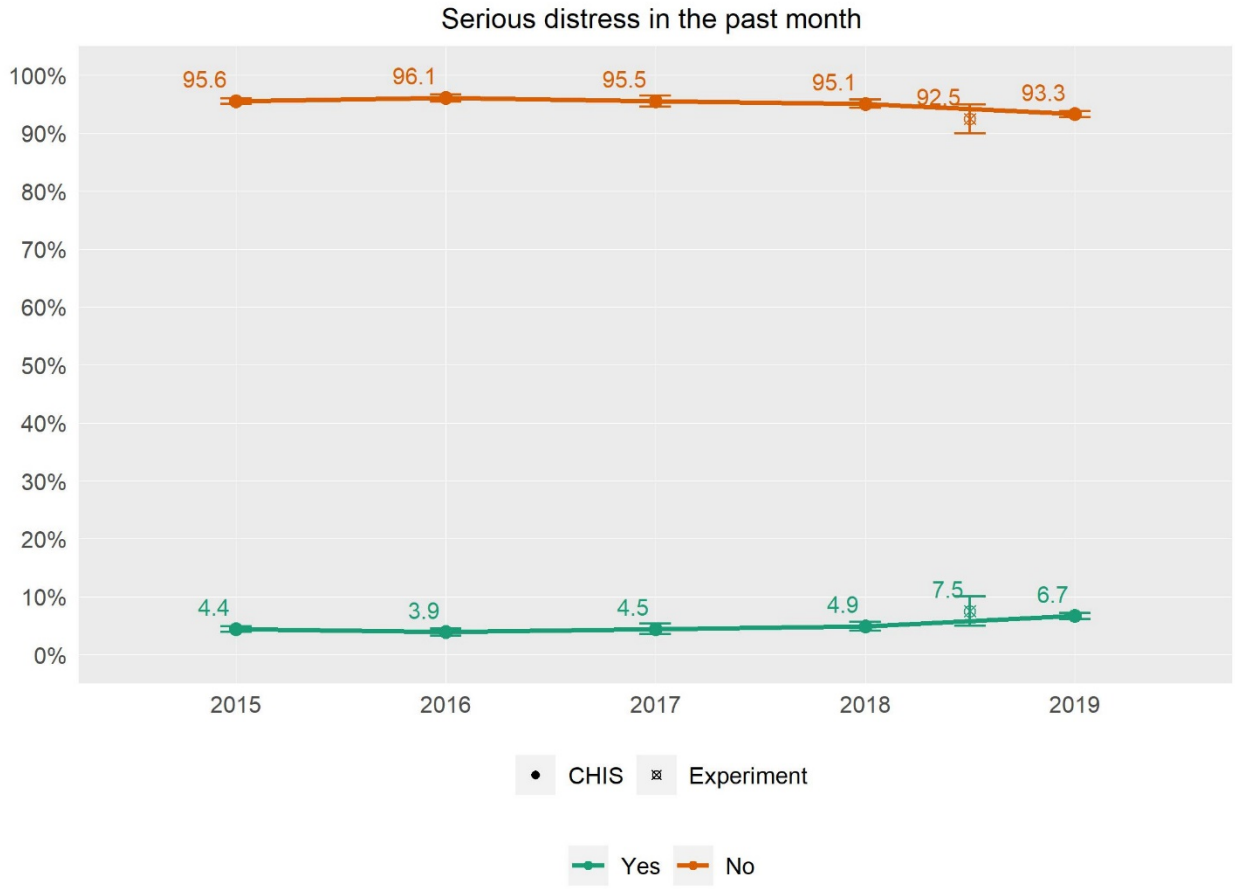

| Body mass index | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| Underweight/ Normal | 37.4 (36.2, 38.6) | 37.3 (35.4, 39.3) | 39.6 (37.0, 42.2) | 39.9 (38.4, 41.4) | 40.3 (39.5, 41.2) | 42.0 (38.1, 45.9) |
| Overweight | 34.7 (33.3, 36.1) | 34.8 (32.5, 37.1) | 33.9 (31.2, 36.7) | 33.1 (31.7, 34.4) | 32.4 (31.4, 33.4) | 33.2 (29.7, 36.8) |
| Obese | 27.9 (26.5, 29.3) | 27.9 (26.1, 29.7) | 26.4 (25.4, 27.5) | 27.1 (25.9, 28.3) | 27.3 (26.5, 28.1) | 24.8 (21.4, 28.2) |

Ever seriously thought about committing suicide continues to steadily increase over time consistent with previous cycles.




| Suicide ideation | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| No | 90.3 (89.5, 91.2) | 90.7 (89.6, 91.8) | 88.4 (87.4, 89.4) | 86.6 (85.6, 87.5) | 86.0 (85.2, 86.7) | 86.1 (82.9, 89.3) |
| Yes | 9.7 (8.8, 10.5) | 9.3 (8.2, 10.4) | 11.6 (10.6, 12.6) | 13.4 (12.5, 14.4) | 14.0 (13.3, 14.8) | 13.9 (10.7, 17.1) |

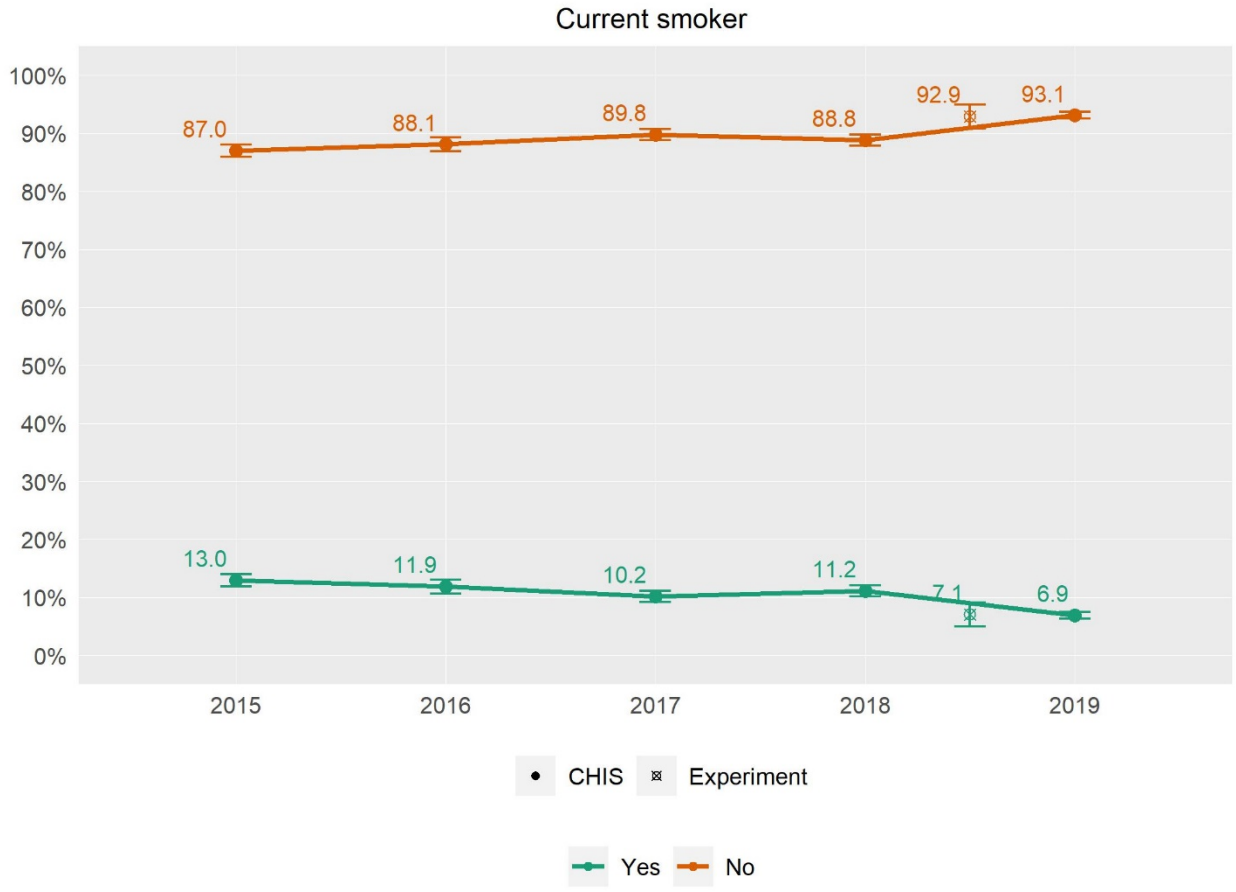
However related to another mental health variable, we do see increased prevalence of severe psychological distress within the past month from 4.9% to 6.7%. This is mostly in the 18-24 and 25-39 age groups with the former raising from 8.9% to 15.1%, the latter 5.3% to 8.1%.




| Serious distress in the past month | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| No | 95.6 (95.1, 96.0) | 96.1 (95.5, 96.7) | 95.5 (94.6, 96.5) | 95.1 (94.4, 95.8) | 93.3 (92.8, 93.8) | 92.5 (90.0, 95.0) |
| Yes | 4.4 (4.0, 4.9) | 3.9 (3.3, 4.5) | 4.5 (3.5, 5.4) | 4.9 (4.2, 5.6) | 6.7 (6.2, 7.2) | 7.5 (5.0, 10.0) |

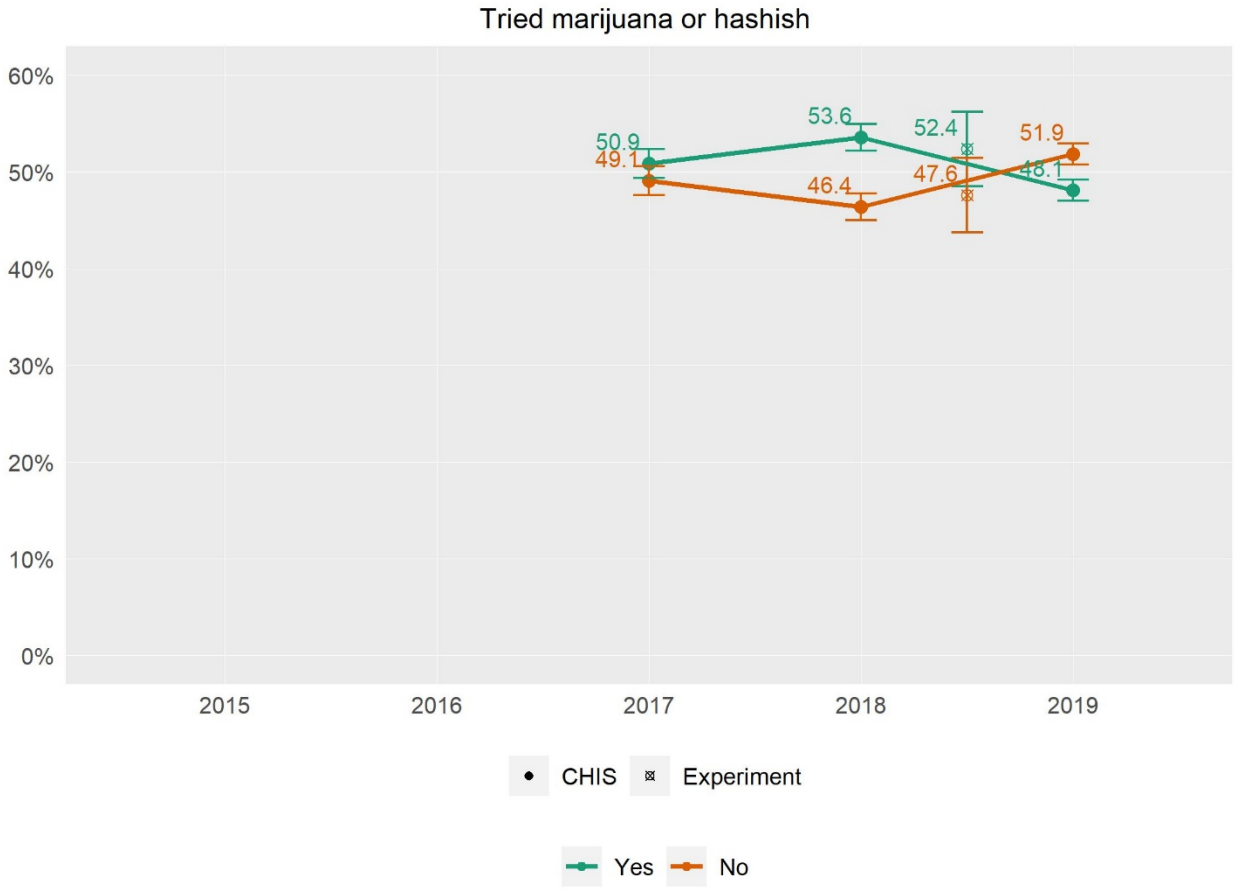
*Health behaviors*

Moving on to health behaviors, the rate of current smokers continues to decline year-to-year, however, the drop from 2018 to 2019 is statistically significant from 11.2% to 6.9%. Examining this trend by age, we see that there is a significant drop in reported smoking for those aged 25-39 from 15.4% to 6.8%. Examining by race/ethnic group, a particularly large drop in the other race category which includes NHPI, AIAN, and two or more race persons. This decrease in current smoking status due to mode differences has been observed by other research (e.g., Link & Mokdad, 2005).



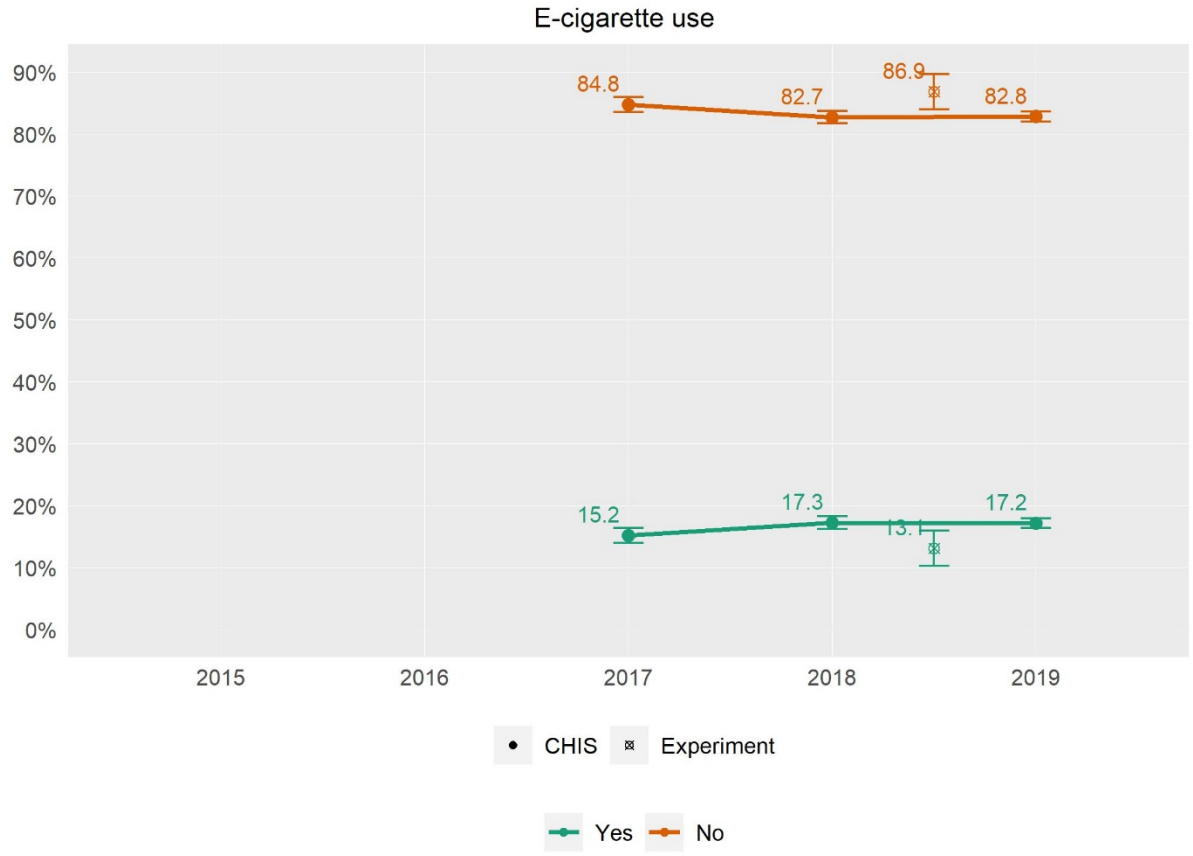

| Current smoker | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| No | 87.0 | 88.1 | 89.8 | 88.8 | 93.1 | 92.9 |
| | (86.0, 88.1) | (86.9, 89.3) | (88.8, 90.7) | (87.9, 89.8) | (92.5, 93.7) | (90.9, 95.0) |
| Yes | 13.0 | 11.9 | 10.2 | 11.2 | 6.9 | 7.1 |
| | (11.9, 14.0) | (10.7, 13.1) | (9.3, 11.2) | (10.2, 12.1) | (6.3, 7.5) | (5.0, 9.1) |

For marijuana use ever, we see a drop from 53.6% in 2018 to 48.1% in 2019. By age group these trends look very different. Those aged 25-64 fit the overall trend, while those aged 65+ saw increasing rates of marijuana usage. As a potentially sensitive variable, we might expect increased reporting of marijuana usage.




| Tried marijuana ever | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|
| Yes | 50.9 (49.4, 52.4) | 53.6 (52.2, 55.0) | 48.1 (47.1, 49.2) | 52.4 (48.6, 56.2) |
| No | 49.1 (47.6, 50.6) | 46.4 (45.0, 47.8) | 51.9 (50.8, 52.9) | 47.6 (43.8, 51.4) |

For e-cigarette use, we first need to note the change in question presentation. In CHIS 2018, the respondent was asked, "Have you ever used any type of e-cigarette, vape pen or e-hookah, such as Blu, NJOY, or Vuse, or any larger devices for vaping, sometimes called vapes, tanks or mods?" In order to simplify the question while still providing necessary context, CHIS 2019 used an introduction screen providing the necessary definitions along with examples[7] and then asking a more generic question that did not mention specific e-cigarette brands and products. The final question was, "Have you ever used an e-cigarette or other electronic vaping product, even just once in your lifetime?" Despite the multiple changes to the question format, we feel that these questions are more conceptually equivalent compared to the e-cigarette use questions asked before 2017. The estimate remained consistent between 2018 and 2019.

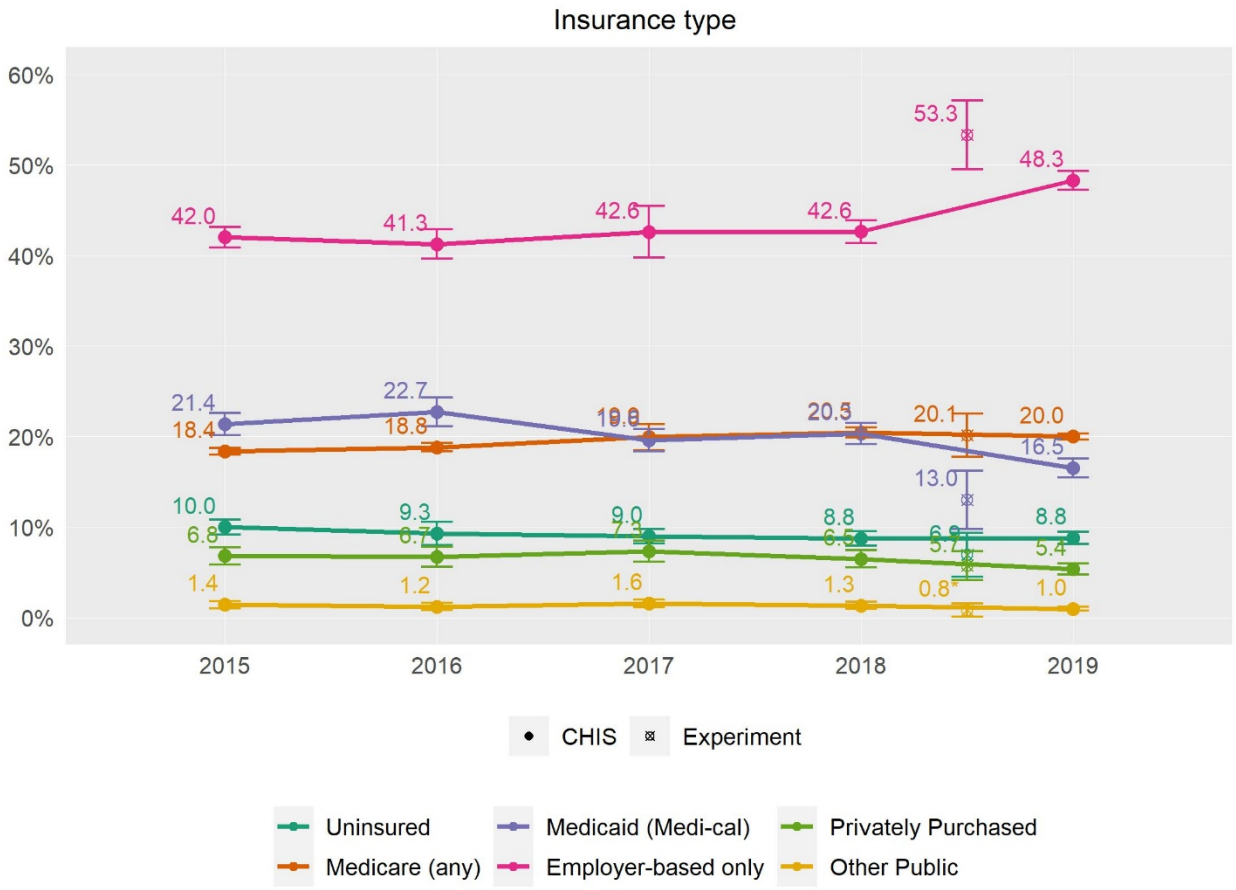



| E-cigarette use ever | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|
| No | 84.8 | 82.7 | 82.8 | 86.9 |
| | (83.6, 86.0) | (81.7, 83.7) | (82.0, 83.6) | (84.0, 89.7) |
| Yes | 15.2 | 17.3 | 17.2 | 13.1 |
| | (14.0, 16.4) | (16.3, 18.3) | (16.4, 18.0) | (10.3, 16.0) |

[7] E-cigarette introduction: "The next questions are about electronic cigarettes and other electronic vaping products. These products typically contain nicotine, flavors, and other ingredients. They may also be called e-cigs, vape pens, pod mods, hookah pens or e-hookah. Popular brands include JUUL, Blu, NJOY, Suorin, and Vuse."

*Health insurance*

Considering the type of health insurance for all adults 18+ years old, we observe large increases in employer-based only insurance raising from 42.6% in 2017 and 2018 up to 48.3% in 2019. There is a subsequent decrease in Medicaid (Medi-Cal) from around 20.3% down to 16.5%. This pattern is seen across all FPL groups greater than 139% FPL. This is also observed in those aged 25-64. This change in these two insurance types could be explained by the continual shift in FPL, obtaining respondents who are better off financially. However, comparisons to the 1-year estimates from ACS 2018 and 2019 suggest that CHIS 2019 is much closer to ACS estimates of employer-based and Medicaid insurance coverage than CHIS 2018 (see Table 6 and Figure 2).



| Insurance type | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| Employer-based only | 42.0 (40.9, 43.2) | 41.3 (39.6, 42.9) | 42.6 (39.8, 45.5) | 42.6 (41.4, 43.9) | 48.3 (47.3, 49.3) | 53.3 (49.5, 57.2) |
| Medicaid (Medi-Cal) | 21.4 (20.2, 22.6) | 22.7 (21.1, 24.3) | 19.6 (18.3, 20.8) | 20.3 (19.1, 21.5) | 16.5 (15.5, 17.6) | 13.0 (9.8, 16.2) |
| Medicare | 18.4 (18.0, 18.7) | 18.8 (18.4, 19.3) | 19.9 (18.5, 21.4) | 20.5 (19.9, 21.0) | 20.0 (19.7, 20.3) | 20.1 (17.8, 22.5) |
| Privately Purchased | 6.8 (5.9, 7.8) | 6.7 (5.6, 7.8) | 7.3 (6.2, 8.5) | 6.5 (5.5, 7.4) | 5.4 (4.8, 6.0) | 5.7 (4.1, 7.4) |
| Other Public | 1.4 (1.0, 1.8) | 1.2 (0.8, 1.6) | 1.6 (1.1, 2.0) | 1.3 (1.0, 1.7) | 1.0 (0.7, 1.2) | 0.8* (0.1, 1.6) |
| Uninsured | 10.0 (9.2, 10.8) | 9.3 (8.0, 10.6) | 9.0 (8.2, 9.8) | 8.8 (8.0, 9.6) | 8.8 (8.1, 9.5) | 6.9 (4.5, 9.4) |

Note. * = statistically unstable.

Table 6. Insurance type comparison between CHIS and ACS

| | CHIS 2018 | CHIS 2019 | ACS 2018 | ACS 2019 |
|---|---|---|---|---|
| Employer-based | | | | |
| 18+ | 49.42 | 55.46 | 52.57 | 53.18 |
| 18-64 | 56.85 | 62.18 | 57.64 | 58.58 |
| 65+ | 18.19 | 27.74 | 30.29 | 30.23 |
| Medicare | | | | |
| 18+ | 20.47 | 20.00 | 19.67 | 20.08 |
| 18-64 | 2.87 | 2.11 | 2.67 | 2.61 |
| 65+ | 94.45 | 93.85 | 94.30 | 94.34 |
| Medicaid (Medi-Cal) | | | | |
| 18+ | 26.87 | 20.65 | 21.63 | 20.72 |
| 18-64 | 26.72 | 21.54 | 21.70 | 20.66 |
| 65+ | 27.50 | 16.95 | 21.33 | 20.98 |

Source: UCLA Center for Health Policy Research, California Health Interview Survey 2018-2019; U.S. Census Bureau, American Community Survey 2018-2019.

Note. Differences between these percentages and the above table are due to differential categorizations (e.g., employer-based only to employer-based any).

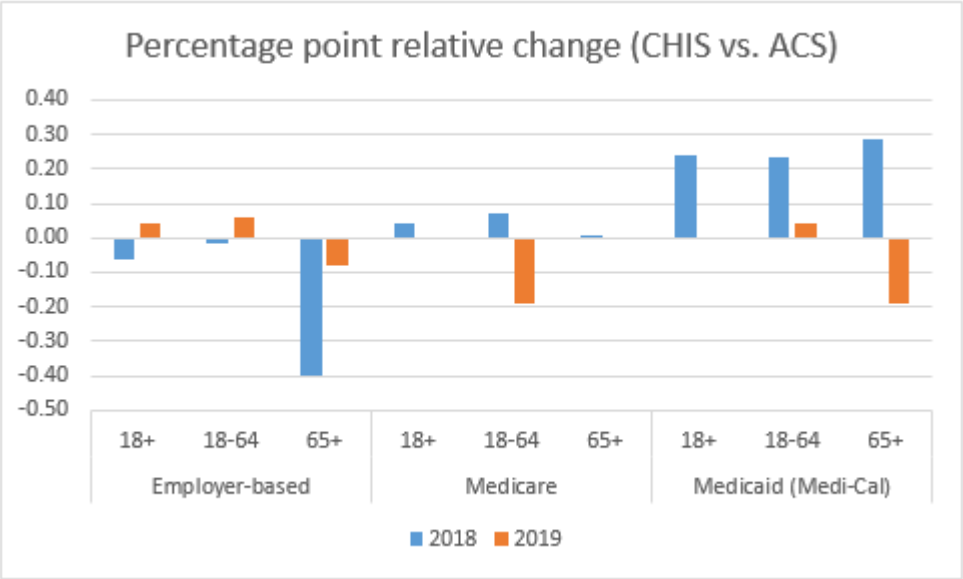
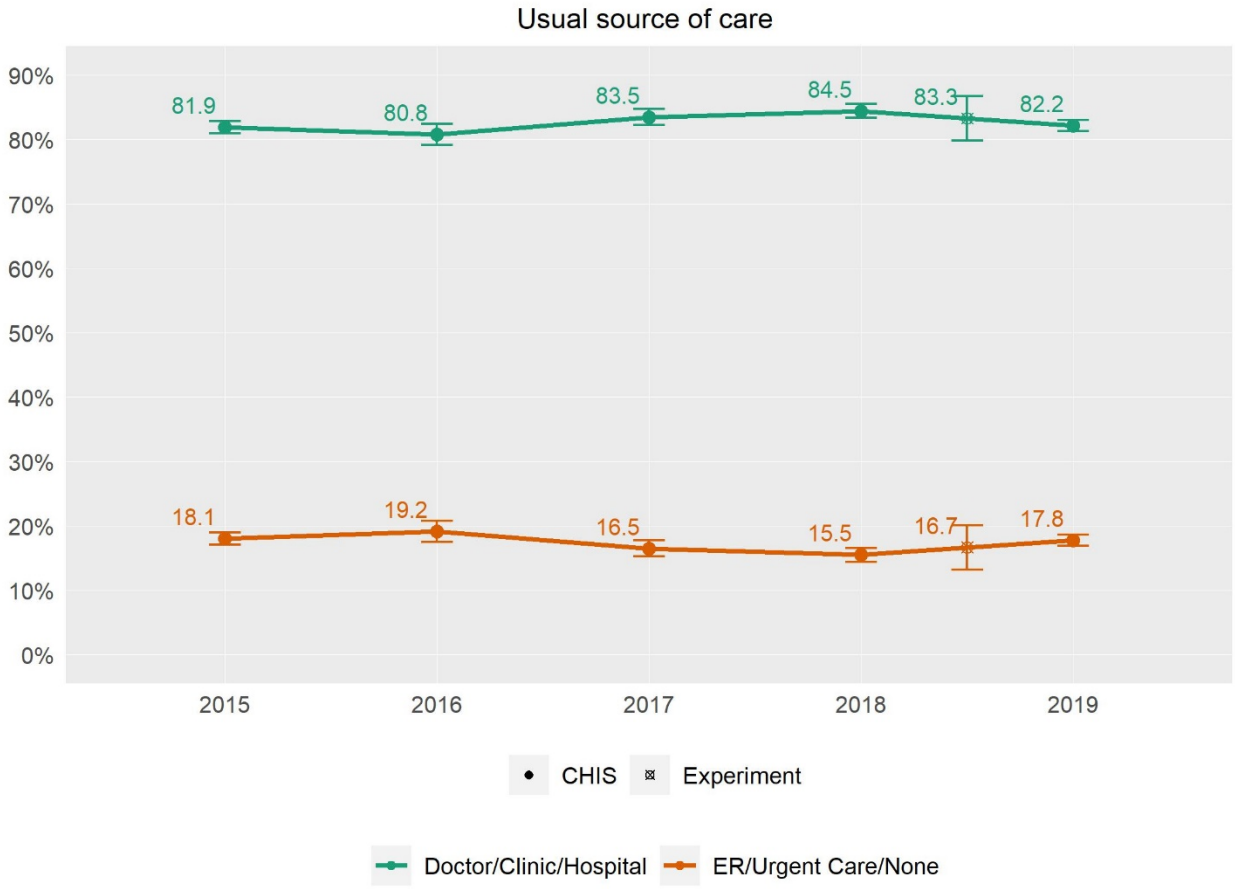



Figure 2. Percentage point relative change between CHIS annual estimates of employer-based, Medicare, and Medicaid with ACS 1-year estimates. The figure compares CHIS 2018 against ACS 2018 1-year estimates and CHIS 2019 against ACS 2019 1-year estimates.

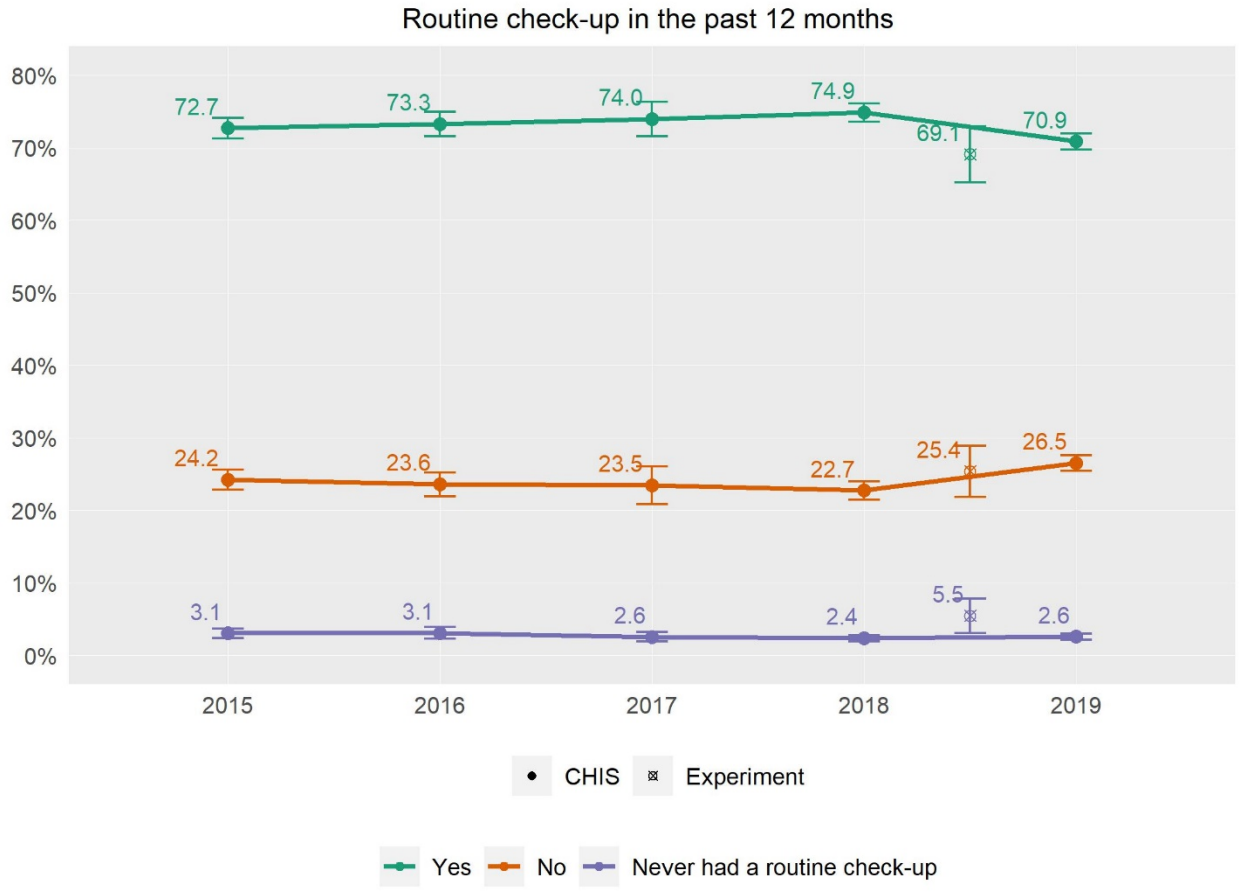
*Health care*

Considering health care utilization measures, we begin with usual source of care. While there has been some minor variability across previous cycles (i.e., average percentage in 2015-2016 vs. 2017-2018), the confidence interval for the 2019 estimate crosses with all of the previous years examined except 2018. So while that specific comparison suggests a statistical difference, it should be argued that the rate of those utilizing a doctor, clinic, or hospital as their usual source of care is relatively consistent with previous years.



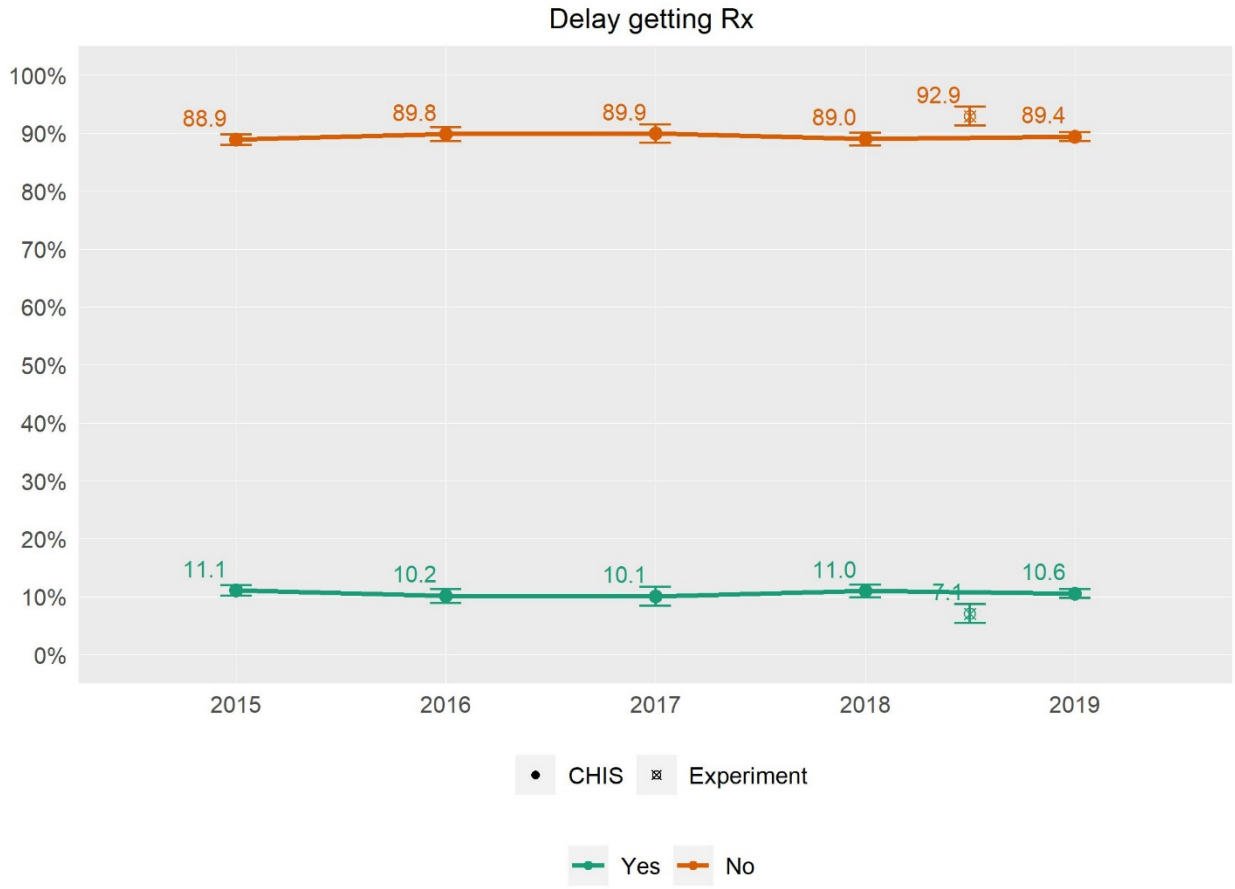

| Usual source of care | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| Doctor/Clinic/ Hospital | 81.9 (81.0, 82.9) | 80.8 (79.2, 82.4) | 83.5 (82.2, 84.7) | 84.5 (83.4, 85.5) | 82.2 (81.3, 83.0) | 83.3 (79.9, 86.8) |
| ER/Urgent Care/ None | 18.1 (17.1, 19.0) | 19.2 (17.6, 20.8) | 16.5 (15.3, 17.8) | 15.5 (14.5, 16.6) | 17.8 (17.0, 18.7) | 16.7 (13.2, 20.1) |

Considering visits to the doctor, we see a decrease in adults having a routine check-up in past 12 months go down to 70.9% from 74.9%. However, the confidence interval estimates for 2019 do often cross with confidence intervals for years previous to 2018 suggesting some degree of stability over years.

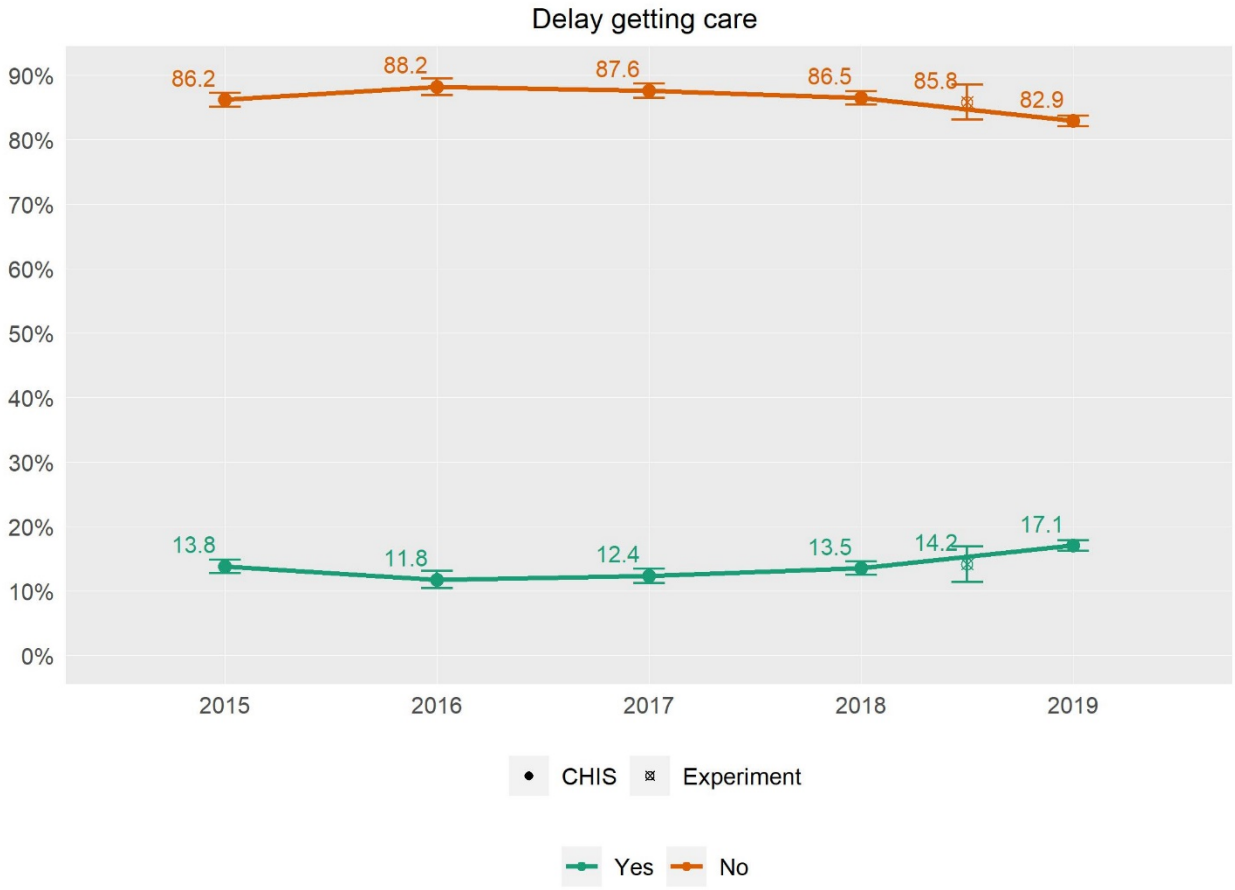



| Doctors visit in past 12 months | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| Yes | 72.7 (71.3, 74.1) | 73.3 (71.6, 74.9) | 74.0 (71.6, 76.4) | 74.9 (73.6, 76.2) | 70.9 (69.8, 72.0) | 69.1 (65.3, 72.9) |
| No | 24.2 (22.9, 25.6) | 23.6 (22.0, 25.3) | 23.5 (20.8, 26.1) | 22.7 (21.5, 24.0) | 26.5 (25.4, 27.6) | 25.4 (21.9, 28.9) |
| Never had a routine check-up | 3.1 (2.4, 3.7) | 3.1 (2.3, 3.9) | 2.6 (1.9, 3.2) | 2.4 (2.0, 2.8) | 2.6 (2.2, 3.0) | 5.5 (3.1, 7.8) |

We next consider delays in health care. Delay getting prescriptions seems consistent with previous cycles, but delays in getting care does seem to have shifted upwards (13.5% in 2018 vs. 17.1% in 2019). The change is differential from what was observed in the web experiment.

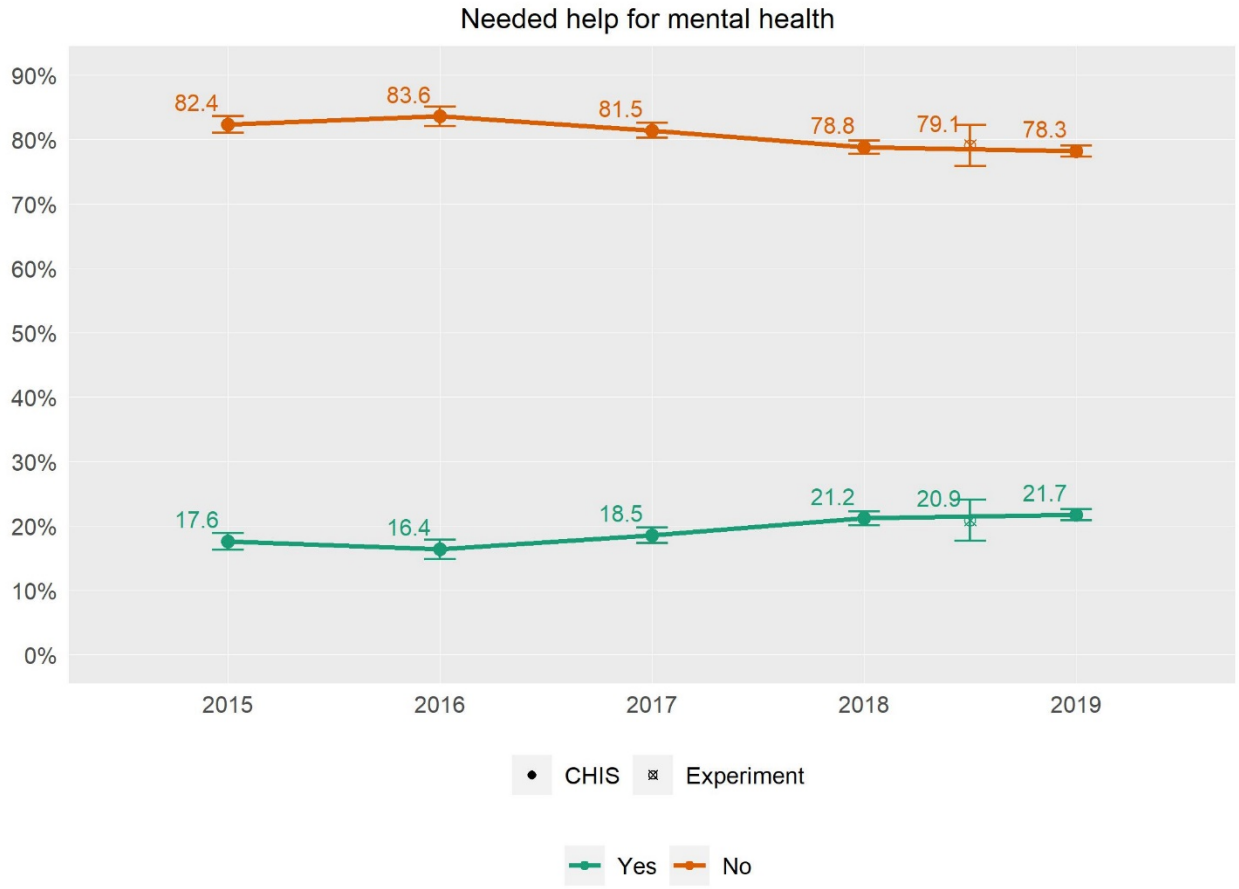



| Delay getting Rx | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| No | 88.9 (88.0, 89.8) | 89.8 (88.6, 91.1) | 89.9 (88.3, 91.5) | 89.0 (87.9, 90.1) | 89.4 (88.6, 90.2) | 92.9 (91.3, 94.5) |
| Yes | 11.1 (10.2, 12.0) | 10.2 (8.9, 11.4) | 10.1 (8.5, 11.7) | 11.0 (9.9, 12.1) | 10.6 (9.8, 11.4) | 7.1 (5.5, 8.7) |

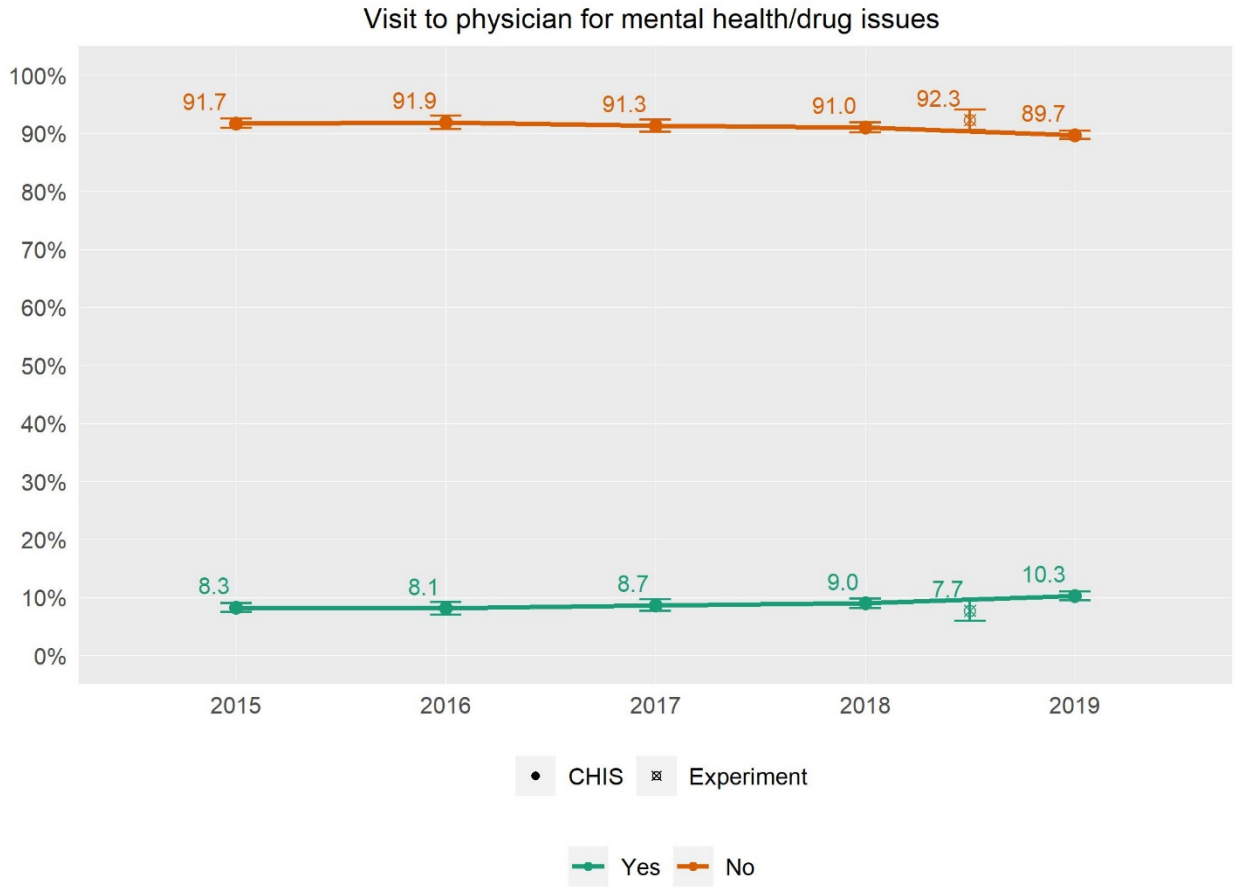



| Delay getting care | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| No | 86.2 (85.2, 87.2) | 88.2 (86.9, 89.5) | 87.6 (86.5, 88.7) | 86.5 (85.4, 87.5) | 82.9 (82.1, 83.8) | 85.8 (83.1, 88.6) |
| Yes | 13.8 (12.8, 14.8) | 11.8 (10.5, 13.1) | 12.4 (11.3, 13.5) | 13.5 (12.5, 14.6) | 17.1 (16.2, 17.9) | 14.2 (11.4, 16.9) |

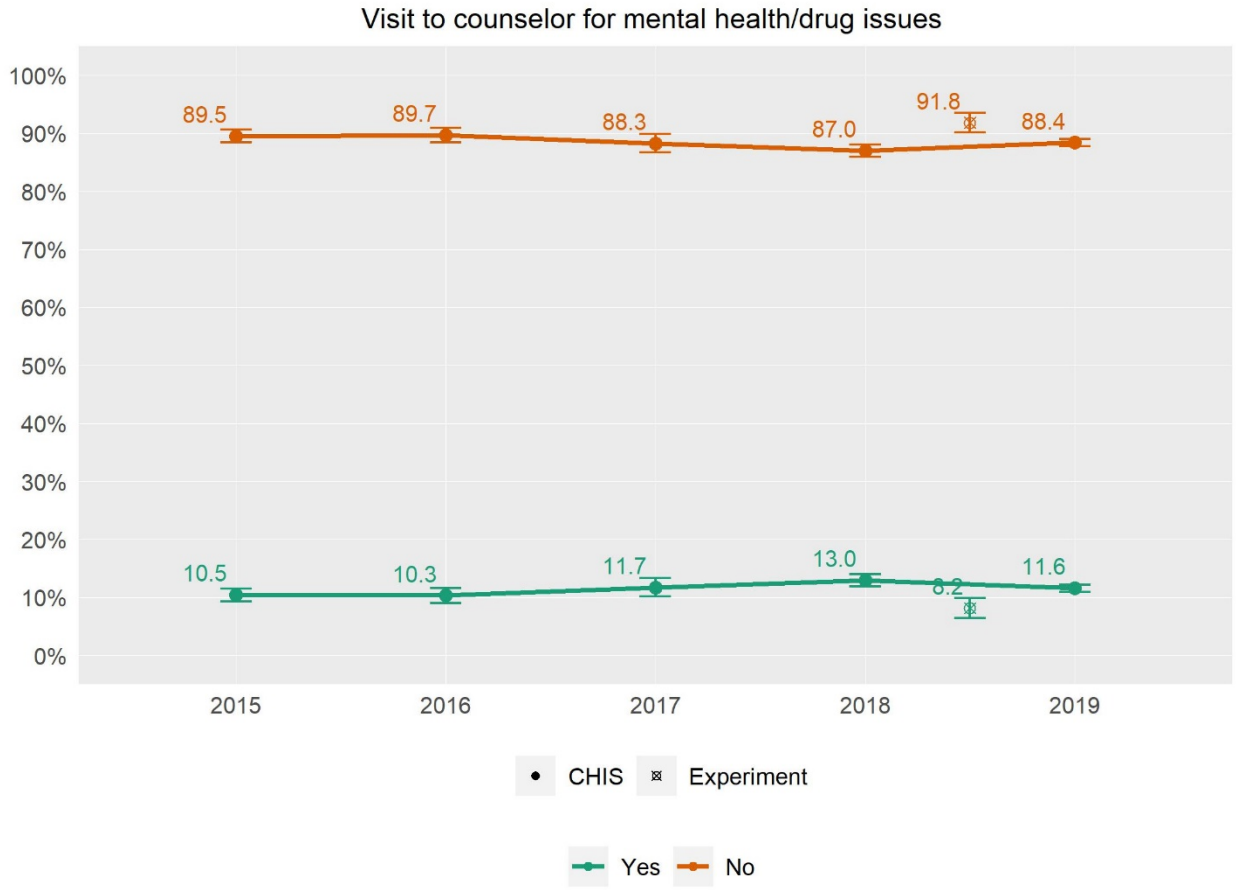
Considering need and use of mental health care, the need for mental health help is consistent with the trend observed in previous cycles. The use of a physician or counselor for mental health or drug abuse also seems consistent with previous cycles.




| Needed help for mental health | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| No | 82.4 (81.1, 83.7) | 83.6 (82.1, 85.1) | 81.5 (80.3, 82.7) | 78.8 (77.7, 79.9) | 78.3 (77.4, 79.1) | 79.1 (75.9, 82.3) |
| Yes | 17.6 (16.3, 18.9) | 16.4 (14.9, 17.9) | 18.5 (17.3, 19.7) | 21.2 (20.1, 22.3) | 21.7 (20.9, 22.6) | 20.9 (17.7, 24.1) |

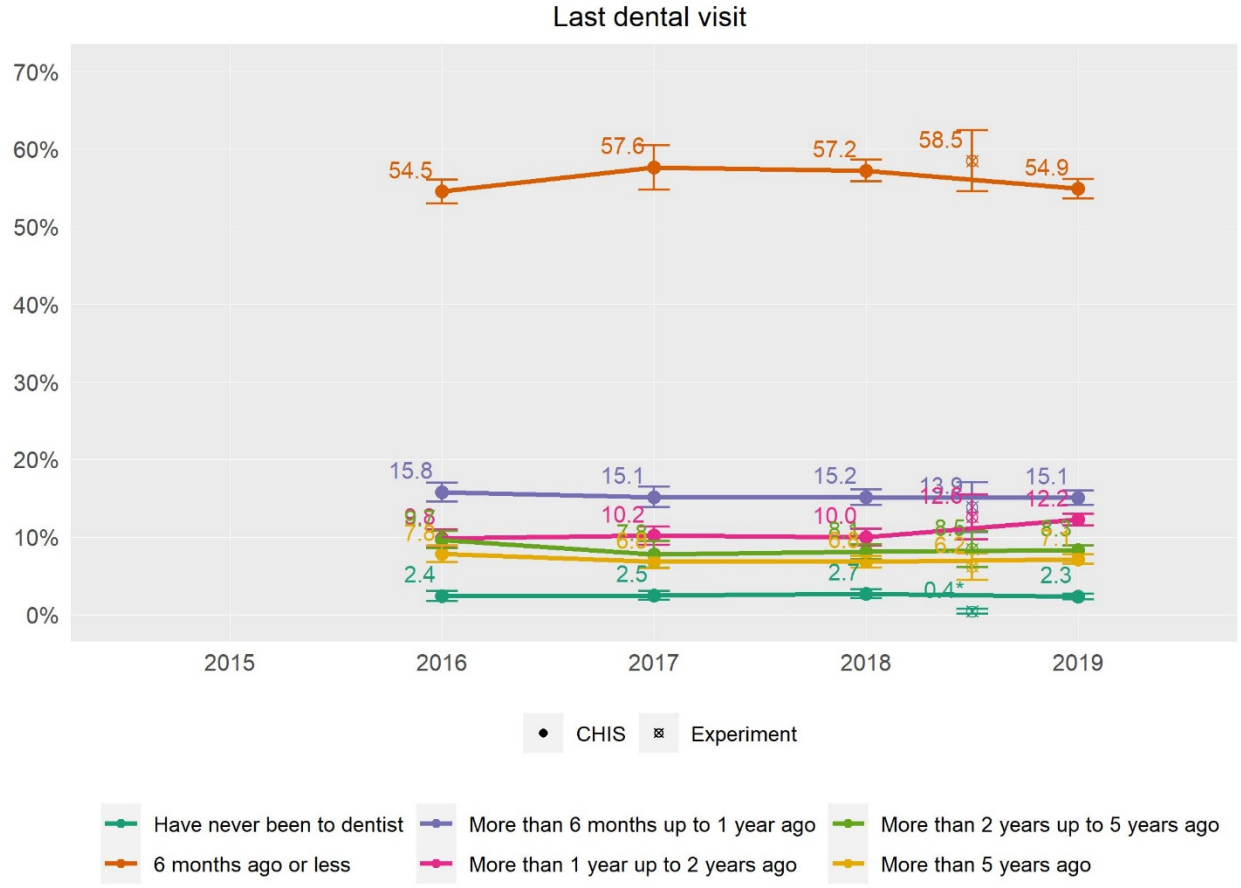



| Physician for mental health | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| No | 91.7 (90.9, 92.5) | 91.9 (90.7, 93.0) | 91.3 (90.3, 92.3) | 91.0 (90.2, 91.9) | 89.7 (89.0, 90.5) | 92.3 (90.5, 94.1) |
| Yes | 8.3 (7.5, 9.1) | 8.1 (7.0, 9.3) | 8.7 (7.7, 9.7) | 9.0 (8.1, 9.8) | 10.3 (9.5, 11.0) | 7.7 (5.9, 9.5) |




| Counselor for mental health | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| No | 89.5 (88.4, 90.6) | 89.7 (88.4, 90.9) | 88.3 (86.7, 89.9) | 87.0 (85.9, 88.1) | 88.4 (87.8, 89.0) | 91.8 (90.1, 93.6) |
| Yes | 10.5 (9.4, 11.6) | 10.3 (9.1, 11.6) | 11.7 (10.1, 13.3) | 13.0 (11.9, 14.1) | 11.6 (11.0, 12.2) | 8.2 (6.4, 9.9) |

Finally, our one adult measure of dental health, last dental visit, is relatively consistent across the various groups. The confidence interval for "more than 1 year up to 2 years ago" does show significant upward change (10.0% in 2018 and 12.2% in 2019) with no other category seeing significant downward changes.

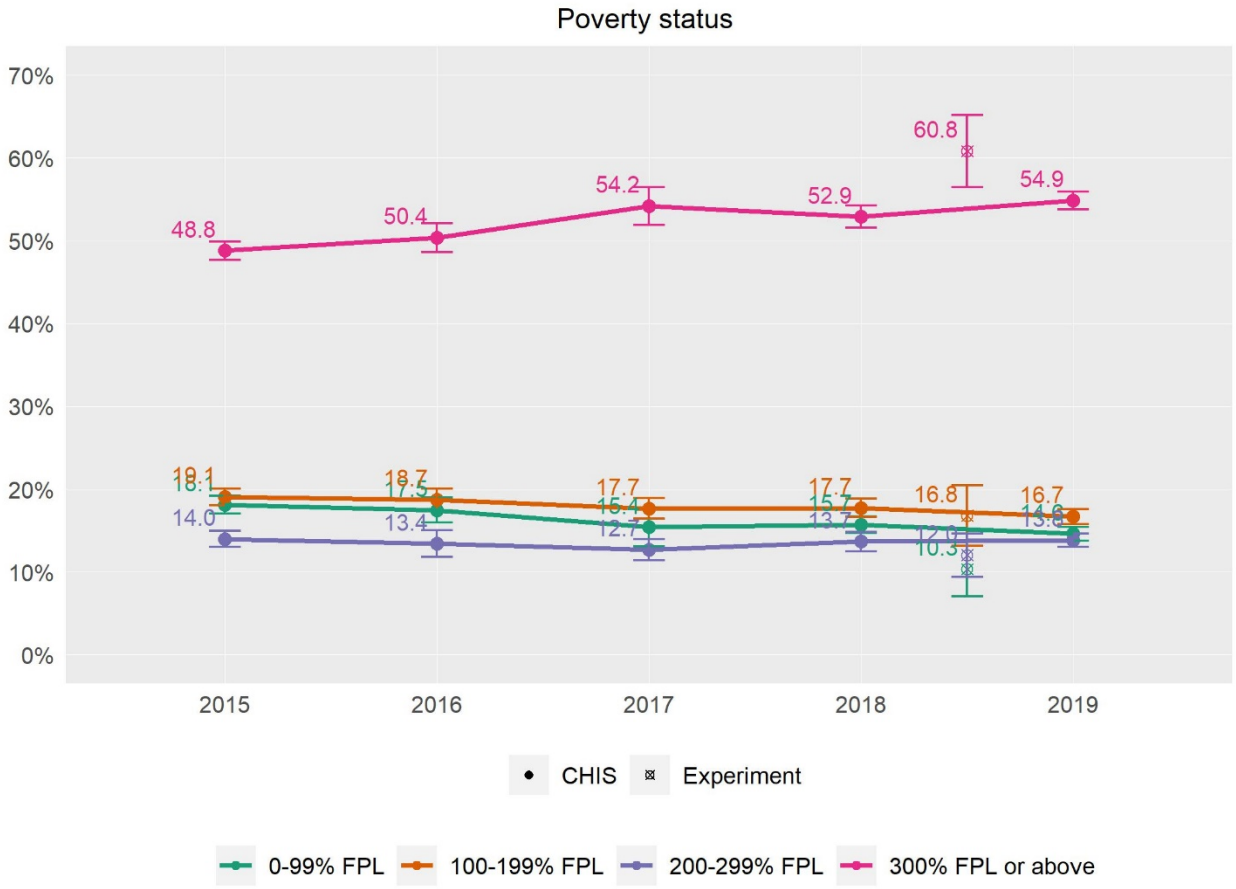



| Last dental visit | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|
| Have never been to dentist | 2.4 (1.8, 3.0) | 2.5 (1.9, 3.0) | 2.7 (2.1, 3.3) | 2.3 (2.0, 2.7) | 0.4* (0.1, 0.7) |
| 6 months ago or less | 54.5 (53.0, 56.0) | 57.6 (54.7, 60.5) | 57.2 (55.8, 58.6) | 54.9 (53.7, 56.1) | 58.5 (54.5, 62.4) |
| More than 6 months up to 1 year ago | 15.8 (14.6, 17.0) | 15.1 (13.8, 16.5) | 15.2 (14.2, 16.2) | 15.1 (14.1, 16.0) | 13.9 (10.6, 17.1) |
| More than 1 year up to 2 years ago | 9.8 (8.7, 11.0) | 10.2 (9.0, 11.4) | 10.0 (8.9, 11.1) | 12.2 (11.5, 13.0) | 12.6 (9.7, 15.5) |
| More than 2 years up to 5 years ago | 9.7 (8.6, 10.7) | 7.8 (6.0, 9.5) | 8.1 (7.1, 9.1) | 8.3 (7.8, 8.9) | 8.5 (6.1, 10.8) |
| More than 5 years ago | 7.8 (6.7, 8.9) | 6.8 (6.0, 7.6) | 6.8 (6.1, 7.6) | 7.1 (6.5, 7.7) | 6.2 (4.5, 7.9) |

Note. * = statistically unstable.

*Socioeconomic*

Finally for adults, we examine socioeconomic factors. As referenced previously, we saw some differences in metrics like health insurance by FPL. Looking directly at FPL, we see that CHIS contains to shift upwards seeing more affluent households. However, a comparison with ACS 1-year weighted estimates (see Table 7) shows CHIS 2019 is slightly closer to ACS estimates reducing the relative difference especially for 200-299% FPL (see Figure 3; for details on relative difference, refer to the notes in section *Sample Composition Breakdown*).




| Poverty status | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| 0-99% FPL | 18.1 (17.1, 19.2) | 17.5 (16.0, 19.0) | 15.4 (13.1, 17.8) | 15.7 (14.7, 16.7) | 14.6 (13.8, 15.4) | 10.3 (7.0, 13.6) |
| 100-199% FPL | 19.1 (18.0, 20.1) | 18.7 (17.4, 20.0) | 17.7 (16.4, 18.9) | 17.7 (16.6, 18.8) | 16.7 (15.8, 17.6) | 16.8 (13.1, 20.5) |
| 200-299% FPL | 14.0 (13.0, 15.0) | 13.4 (11.8, 15.0) | 12.7 (11.4, 14.0) | 13.7 (12.5, 14.8) | 13.8 (13.1, 14.6) | 12.0 (9.4, 14.7) |
| 300% FPL or above | 48.8 (47.7, 49.9) | 50.4 (48.6, 52.2) | 54.2 (51.9, 56.5) | 52.9 (51.6, 54.2) | 54.9 (53.8, 55.9) | 60.8 (56.5, 65.2) |

Table 7. Poverty status comparison between CHIS and ACS

| | CHIS 2018 | CHIS 2019 | ACS 2018 | ACS 2019 |
|---|---|---|---|---|
| 0-99% FPL | 15.70 | 14.61 | 12.73 | 11.77 |
| 100-199% FPL | 17.74 | 16.70 | 17.04 | 16.18 |
| 200-299% FPL | 13.67 | 13.83 | 14.98 | 14.94 |
| >300% FPL | 52.89 | 54.85 | 55.26 | 57.11 |

Source: UCLA Center for Health Policy Research, California Health Interview Survey 2018-2019; U.S. Census Bureau, American Community Survey 2018-2019.
Note. FPL = Federal poverty level.

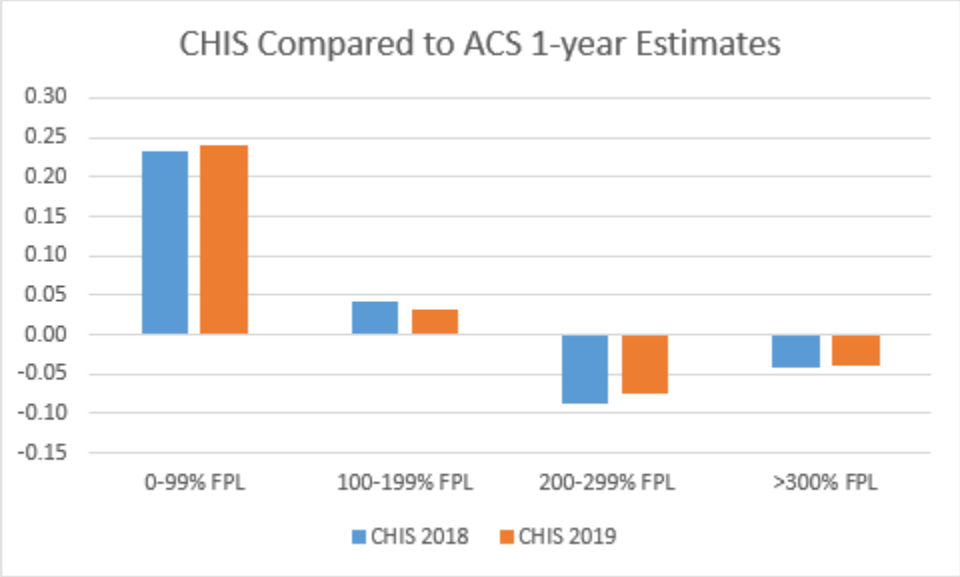
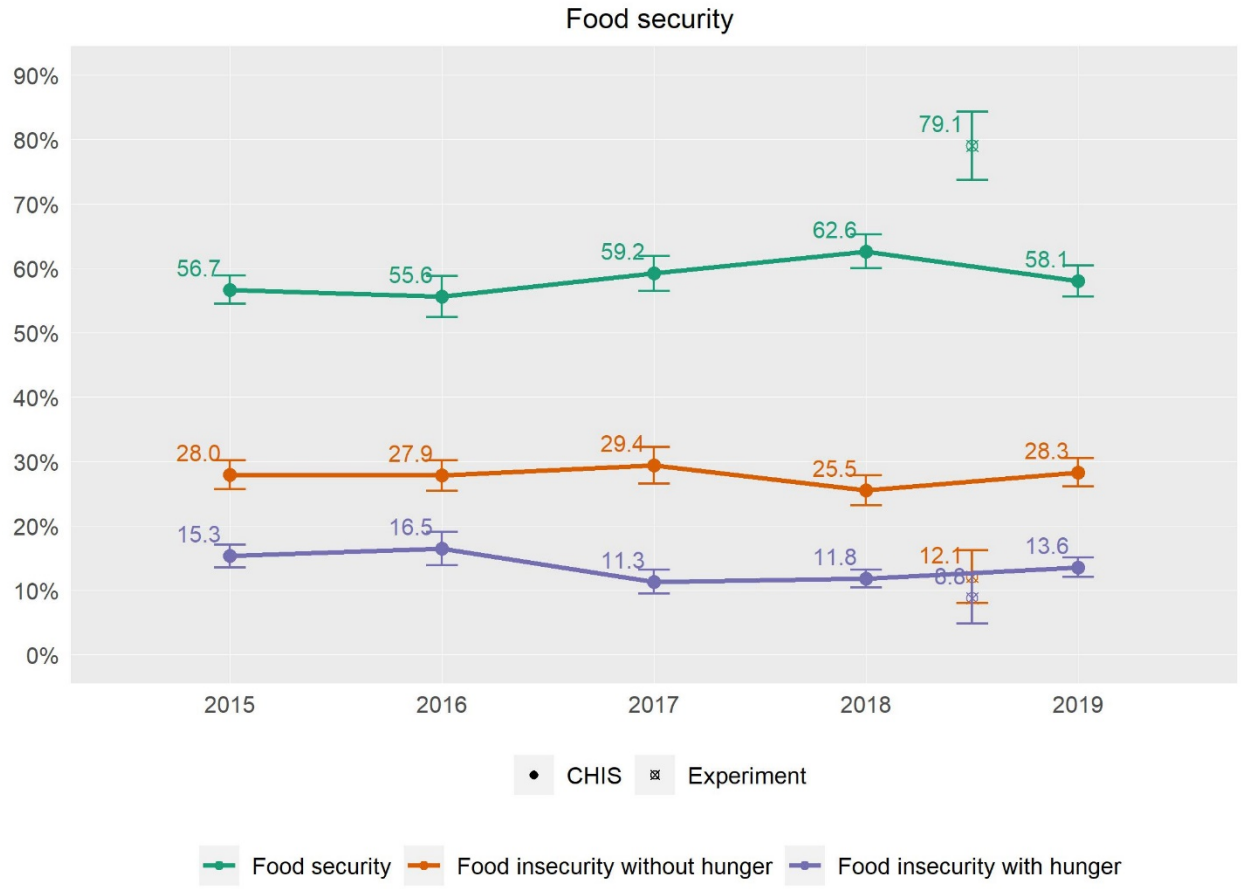


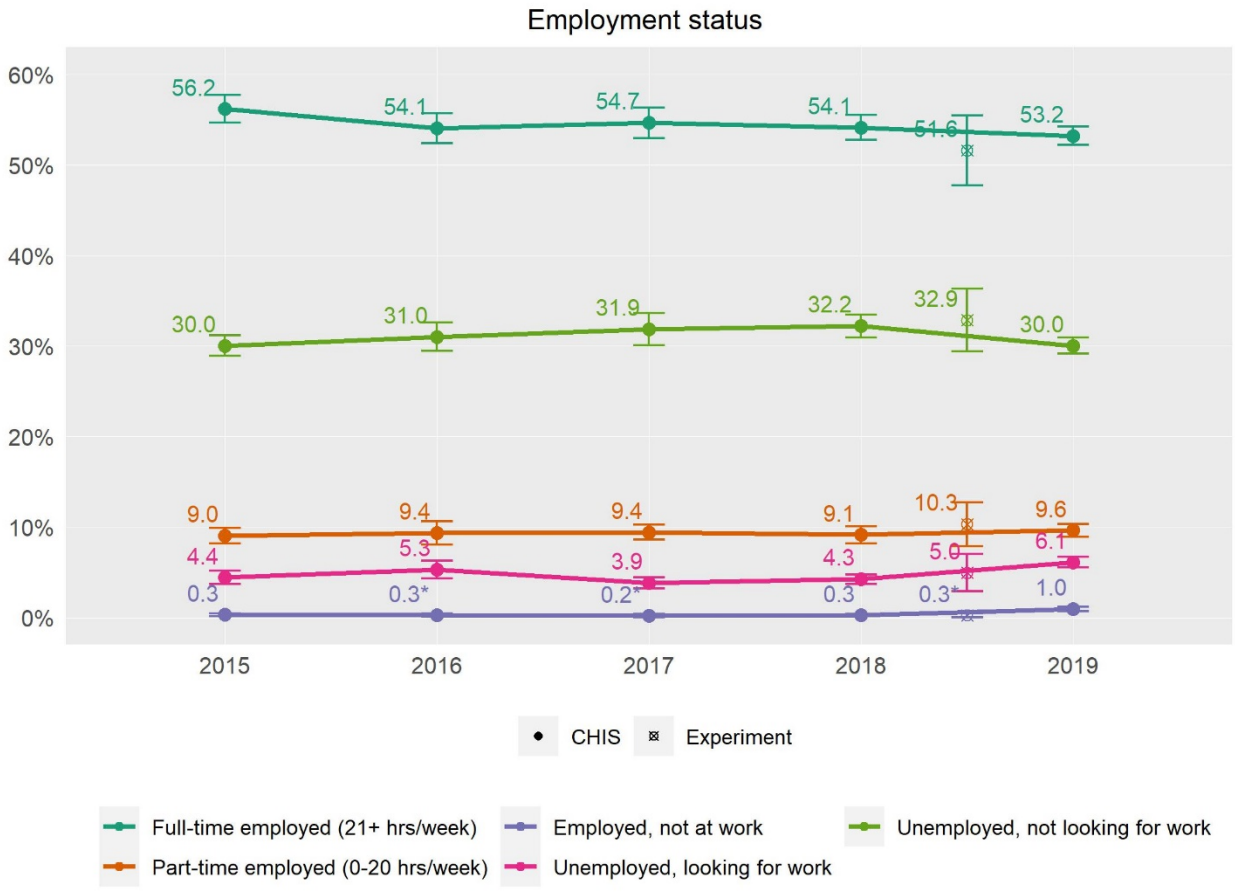

Figure 3. Percentage point relative change between CHIS annual estimates of federal poverty level groups with ACS 1-year estimates. The figure compares CHIS 2018 against ACS 2018 1-year estimates and CHIS 2019 against ACS 2019 1-year estimates.

Food security (asked only of adults with an income less than 200% FPL) remains stable between previous cycles and 2019 and showcases another example of needed corrections from the Fall web experiment.




| Food security | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| Food secure | 56.7 (54.5, 58.9) | 55.6 (52.5, 58.8) | 59.2 (56.5, 61.9) | 62.6 (60.0, 65.3) | 58.1 (55.7, 60.5) | 79.1 (73.8, 84.4) |
| Food insecure without hunger | 28.0 (25.8, 30.2) | 27.9 (25.5, 30.2) | 29.4 (26.6, 32.2) | 25.5 (23.2, 27.9) | 28.3 (26.1, 30.5) | 12.1 (8.1, 16.2) |
| Food insecure with hunger | 15.3 (13.6, 17.1) | 16.5 (13.9, 19.1) | 11.3 (9.5, 13.2) | 11.8 (10.4, 13.2) | 13.6 (12.1, 15.1) | 8.8 (4.9, 12.7) |

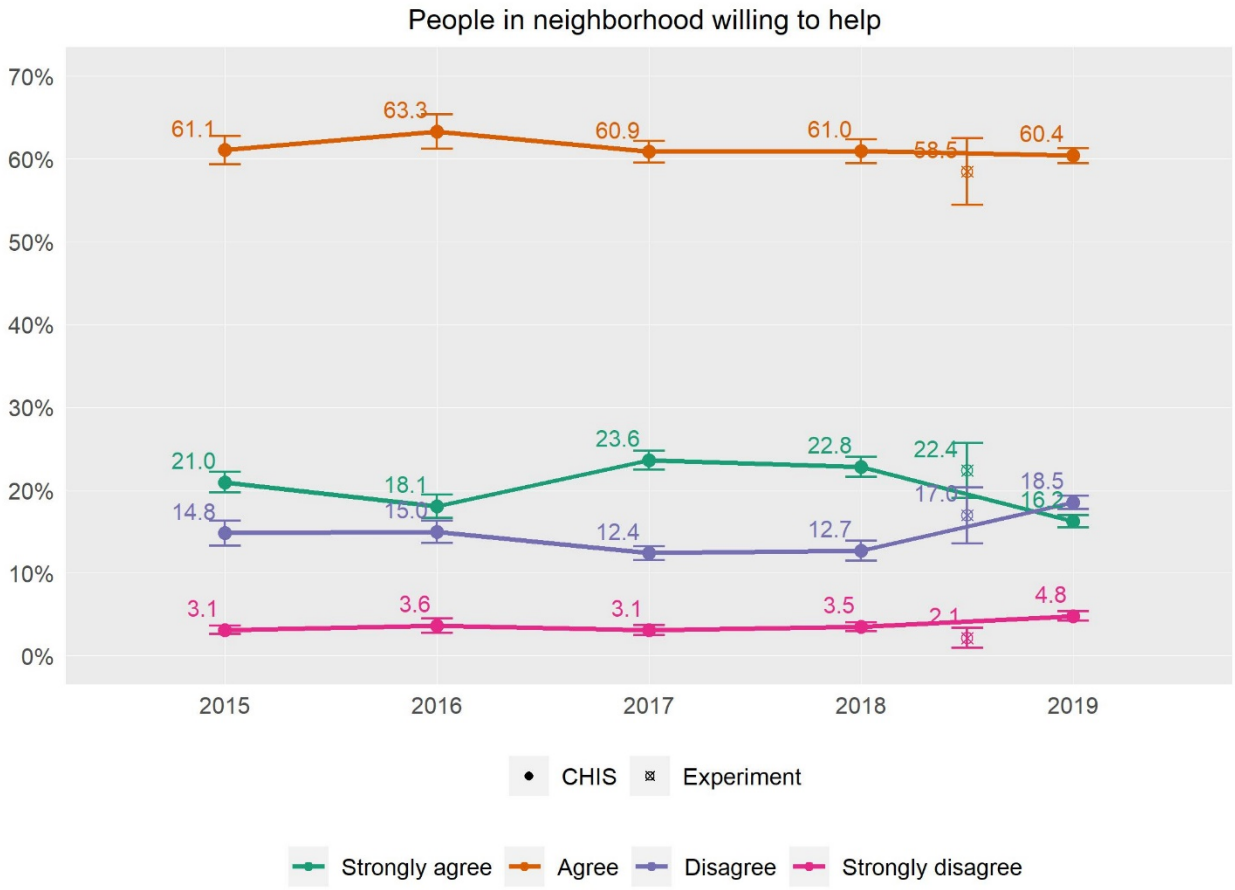
Regarding current employment, we see some shifts in the division of unemployed in specific relation to whether they are or are not looking for work, with the percentage looking for work increasing from 4.3% of total to 6.1% compared to 32.2% to 30.0% for those not looking for work. The percentage of unemployed not looking for work in CHIS 2019 is more consistent with CHIS 2015 and 2016.




| Employment status | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| Full-time employed (21+ hrs/week) | 56.2 (54.6, 57.7) | 54.1 (52.4, 55.7) | 54.7 (53.0, 56.4) | 54.1 (52.7, 55.5) | 53.2 (52.2, 54.2) | 51.6 (47.8, 55.4) |
| Part-time employed (0-20 hrs/week) | 9.0 (8.2, 9.9) | 9.4 (8.1, 10.7) | 9.4 (8.6, 10.3) | 9.1 (8.2, 10.1) | 9.6 (8.9, 10.4) | 10.3 (7.9, 12.7) |
| Employed, not at work | 0.3 (0.2, 0.5) | 0.3 (0.1, 0.4) | 0.2 (0.0, 0.4) | 0.3 (0.1, 0.4) | 1.0 (0.7, 1.2) | 0.3* (0.0, 0.5) |
| Unemployed, looking for work | 4.4 (3.7, 5.2) | 5.3 (4.3, 6.3) | 3.9 (3.2, 4.5) | 4.3 (3.7, 4.8) | 6.1 (5.6, 6.7) | 5.0 (2.9, 7.0) |
| Unemployed, not looking for work | 30.0 (28.9, 31.2) | 31.0 (29.5, 32.6) | 31.9 (30.1, 33.7) | 32.2 (31.0, 33.5) | 30.0 (29.2, 30.9) | 32.9 (29.4, 36.3) |

Note. * = statistically unstable.

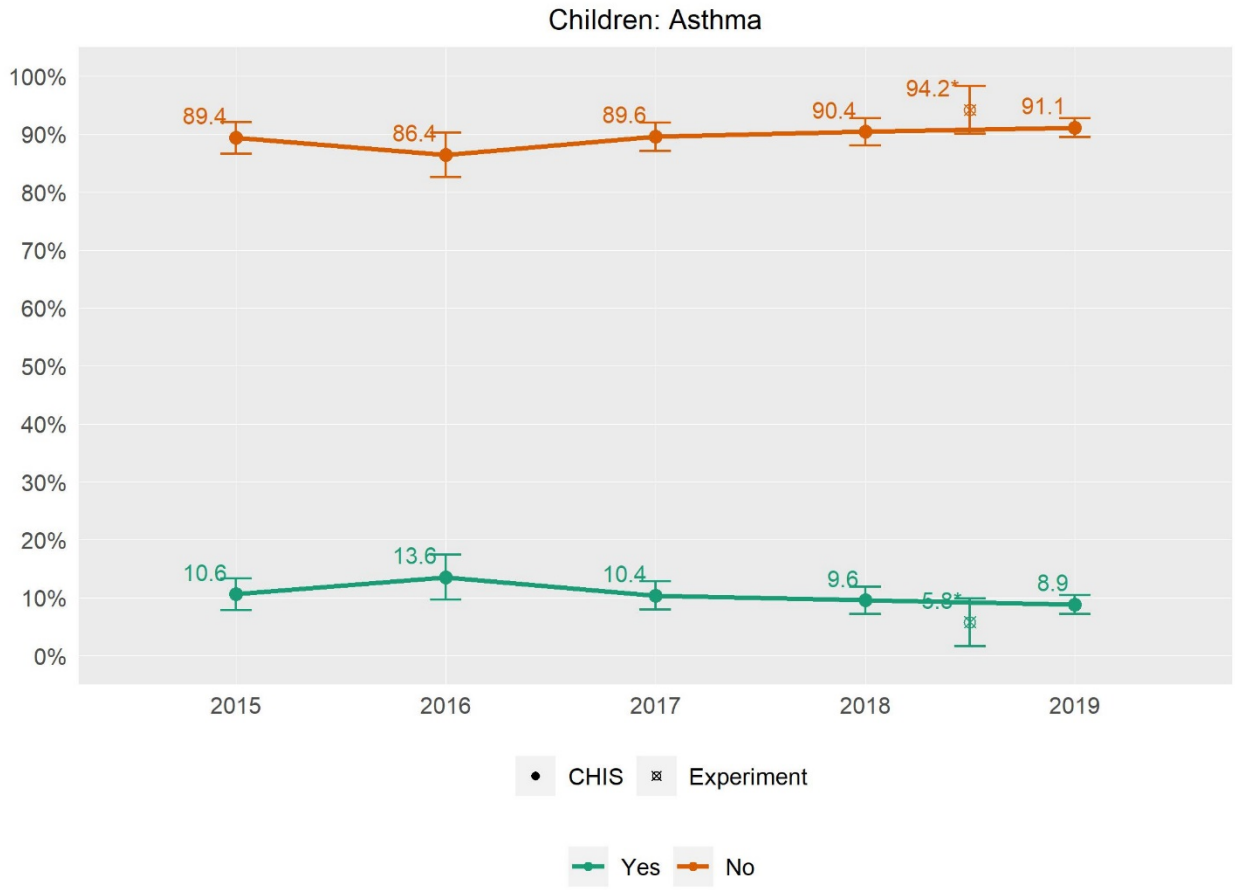
While intended to be paired alongside home ownership discussed previously, our last variable to consider is a whether people in their neighborhood were willing to help each other. There is some major rearranging among strongly agree and disagree responses. There is potential social desirability in responding on CATI with respondents providing potentially more honest responses on web.




| People in neighborhood willing to help | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| Strongly agree | 21.0 (19.7, 22.2) | 18.1 (16.7, 19.4) | 23.6 (22.5, 24.8) | 22.8 (21.6, 24.0) | 16.2 (15.5, 17.0) | 22.4 (19.1, 25.7) |
| Agree | 61.1 (59.4, 62.8) | 63.3 (61.3, 65.4) | 60.9 (59.6, 62.2) | 61.0 (59.5, 62.4) | 60.4 (59.5, 61.3) | 58.5 (54.5, 62.5) |
| Disagree | 14.8 (13.3, 16.3) | 15.0 (13.6, 16.3) | 12.4 (11.5, 13.3) | 12.7 (11.5, 13.9) | 18.5 (17.7, 19.4) | 17.0 (13.6, 20.4) |
| Strongly disagree | 3.1 (2.6, 3.6) | 3.6 (2.7, 4.5) | 3.1 (2.5, 3.7) | 3.5 (3.0, 4.1) | 4.8 (4.2, 5.4) | 2.1 (0.9, 3.3) |

***Child Trend Analysis: 2015-2019***

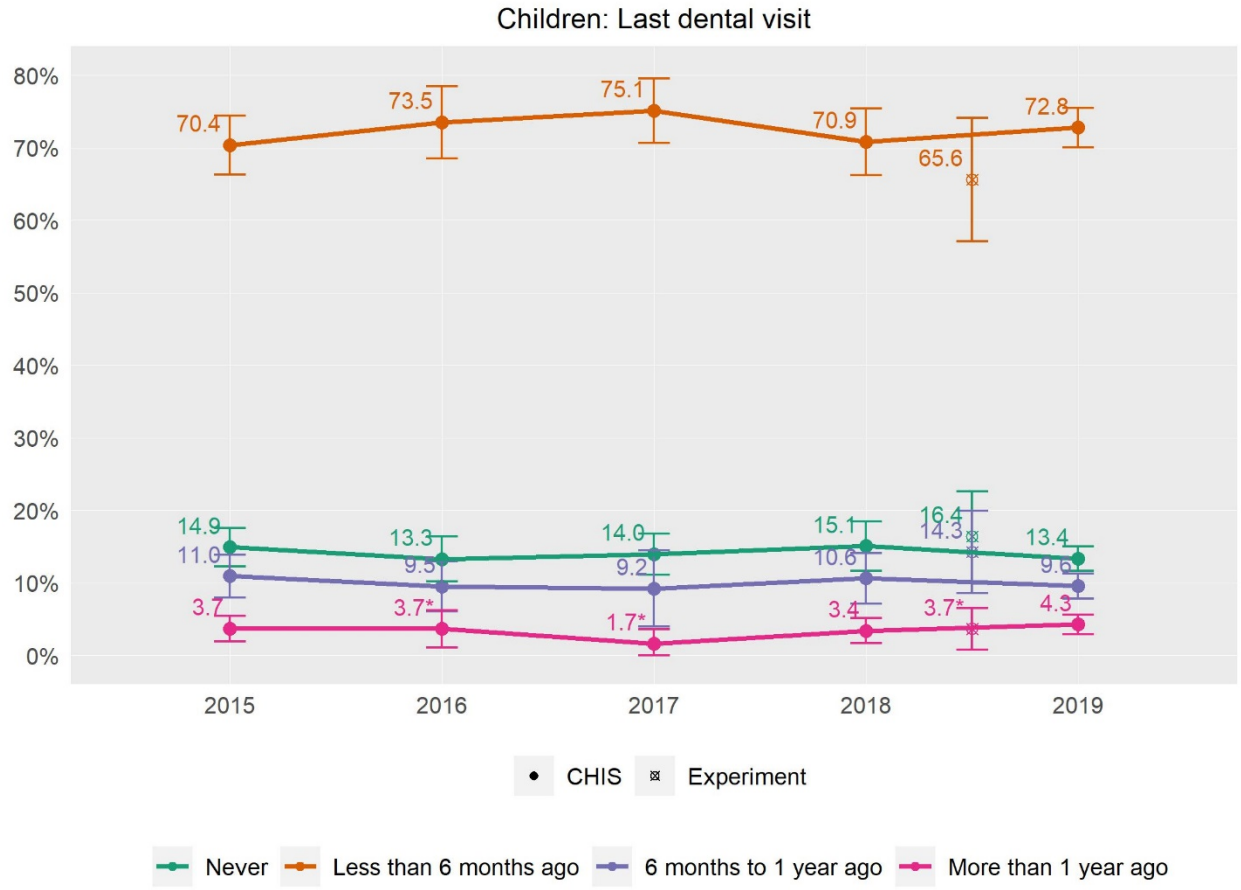
Child estimates saw similar corrections from the Fall web experiment due to potential corrections in the adult survey. In general, about half of the child estimates are consistent with previous cycles including ever had asthma, last dental visit[8], dental insurance, usual source of care, overweight for age, and reading books and singing to children[9].




| Asthma | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| No | 89.4 (86.7, 92.1) | 86.4 (82.6, 90.3) | 89.6 (87.1, 92.0) | 90.4 (88.1, 92.8) | 91.1 (89.5, 92.8) | 94.2* (90.1, 98.3) |
| Yes | 10.6 (7.9, 13.3) | 13.6 (9.7, 17.4) | 10.4 (8.0, 12.9) | 9.6 (7.2, 11.9) | 8.9 (7.2, 10.5) | 5.8* (1.7, 9.9) |

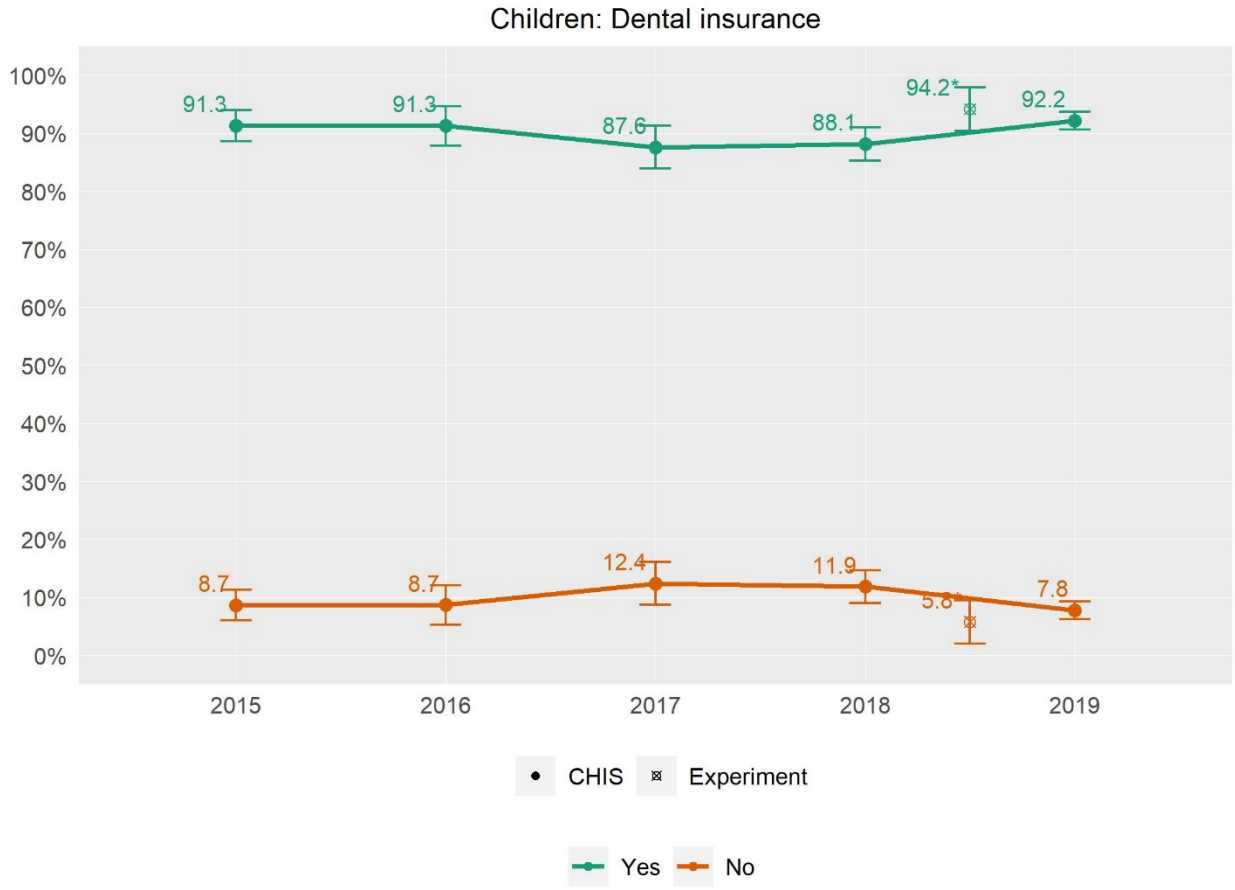
Note. * = statistically unstable.

[8] Asked of all children 2 years of age or older, and of children under 2 years old if they have teeth.
[9] Asked of children under 5 years old.



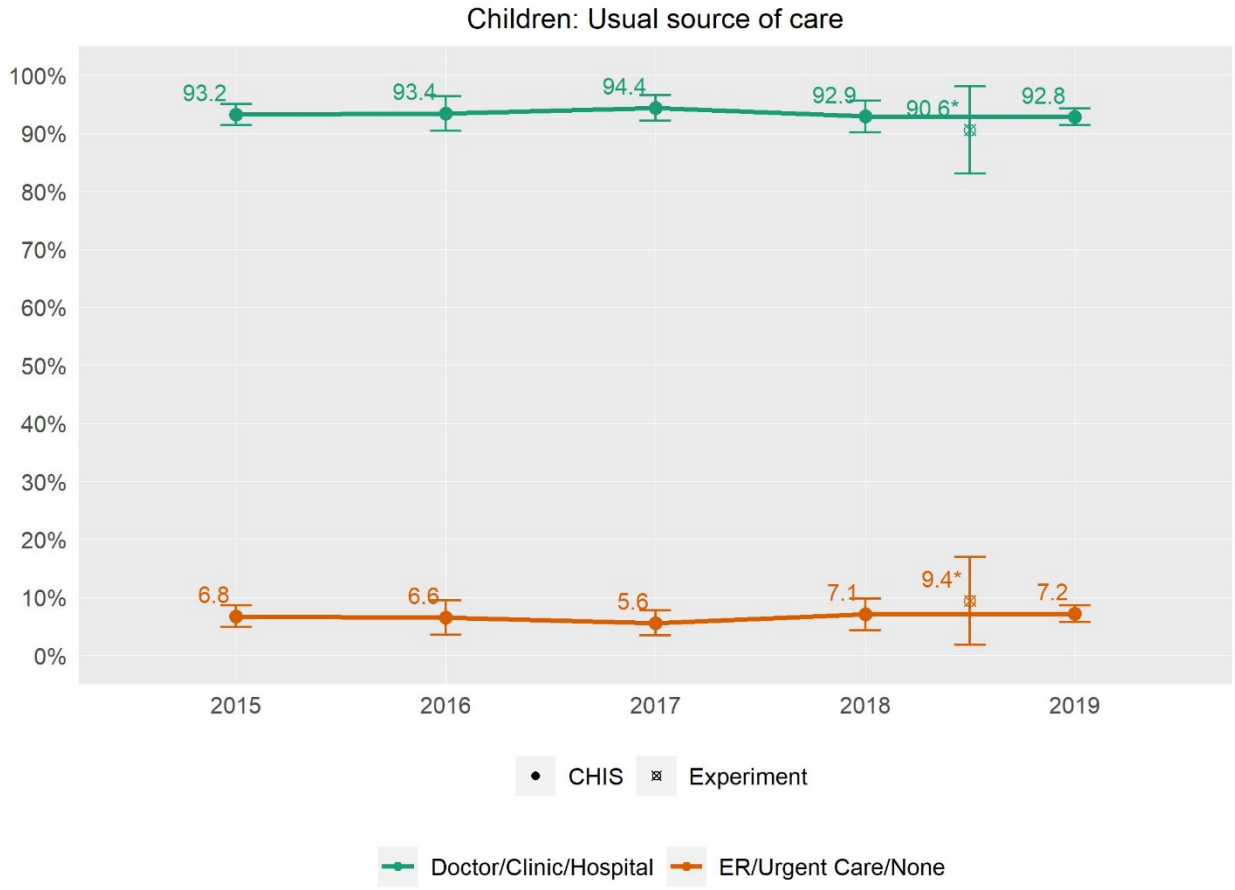

| Last dental visit | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| Never | 14.9 (12.3, 17.6) | 13.3 (10.2, 16.4) | 14.0 (11.1, 16.8) | 15.1 (11.7, 18.5) | 13.4 (11.7, 15.1) | 16.4 (10.2, 22.6) |
| Less than 6 months ago | 70.4 (66.3, 74.4) | 73.5 (68.5, 78.5) | 75.1 (70.7, 79.6) | 70.9 (66.3, 75.4) | 72.8 (70.1, 75.5) | 65.6 (57.1, 74.1) |
| 6 months to 1 year ago | 11.0 (8.0, 13.9) | 9.5 (6.1, 13.0) | 9.2 (4.0, 14.5) | 10.6 (7.2, 14.1) | 9.6 (7.8, 11.3) | 14.3 (8.6, 19.9) |
| More than 1 year ago | 3.7 (1.9, 5.5) | 3.7* (1.1, 6.2) | 1.7* (0.0, 3.6) | 3.4 (1.7, 5.2) | 4.3 (3.0, 5.6) | 3.7* (0.8, 6.5) |

Note. * = statistically unstable.



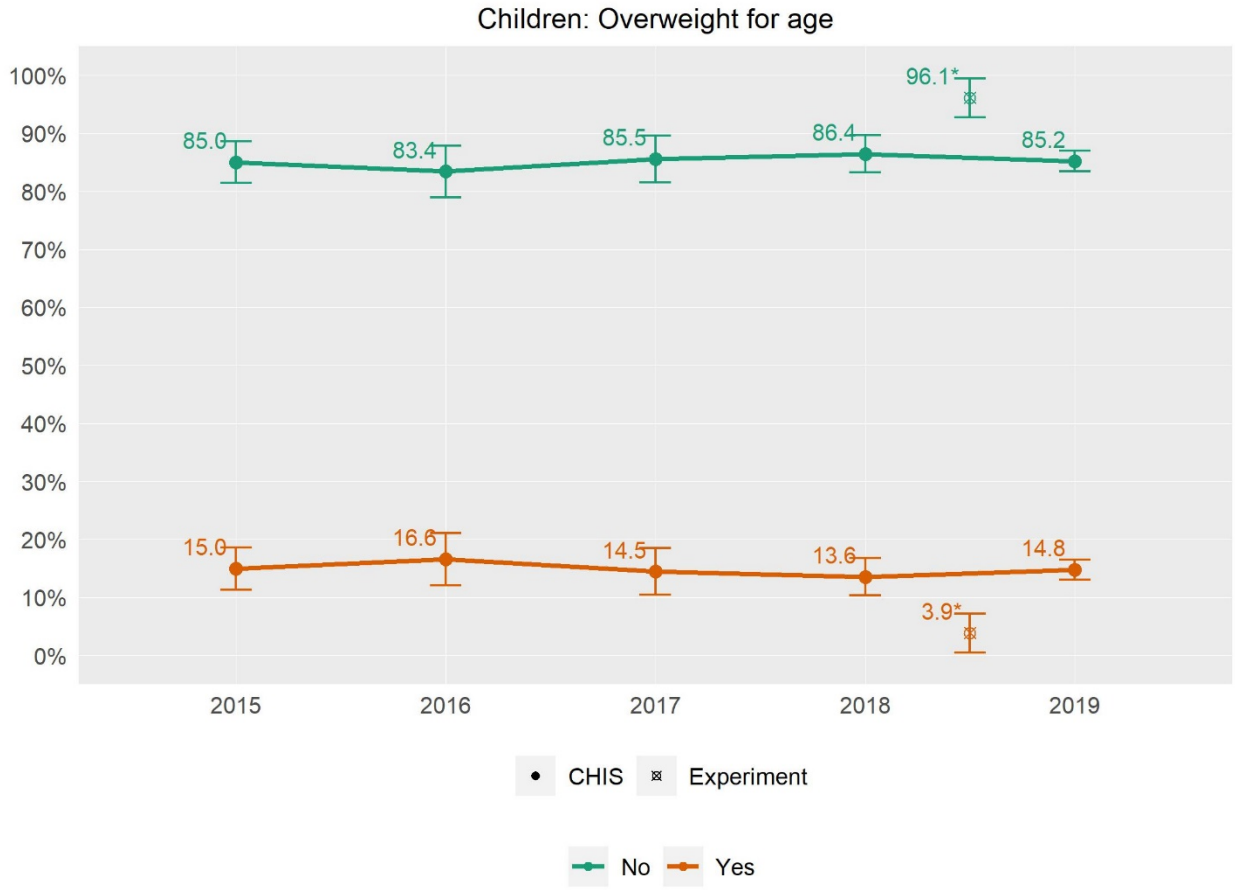

| Dental insurance | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| Yes | 91.3 (88.7, 94.0) | 91.3 (87.9, 94.7) | 87.6 (83.9, 91.3) | 88.1 (85.3, 91.0) | 92.2 (90.6, 93.7) | 94.2* (90.4, 98.0) |
| No | 8.7 (6.0, 11.3) | 8.7 (5.3, 12.1) | 12.4 (8.7, 16.1) | 11.9 (9.0, 14.7) | 7.8 (6.3, 9.4) | 5.8* (2.0, 9.6) |

Note. * = statistically unstable.



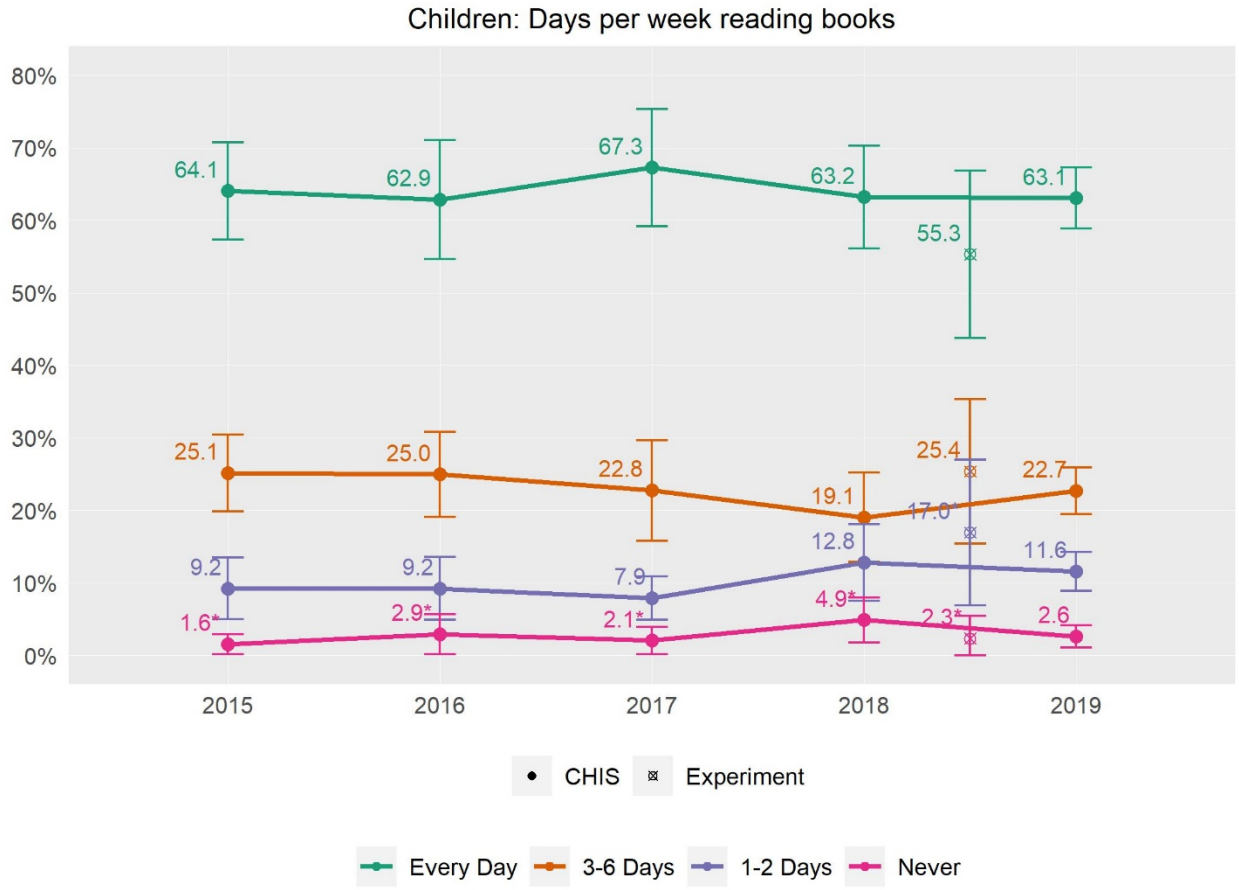

| Usual source of care | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| Doctor/Clinic/ Hospital | 93.2 (91.4, 95.1) | 93.4 (90.5, 96.4) | 94.4 (92.2, 96.5) | 92.9 (90.2, 95.6) | 92.8 (91.4, 94.3) | 90.6* (83.0, 98.1) |
| ER/Urgent Care/ None | 6.8 (4.9, 8.6) | 6.6 (3.6, 9.5) | 5.6 (3.5, 7.8) | 7.1 (4.4, 9.8) | 7.2 (5.7, 8.6) | 9.4* (1.9, 17.0) |

Note. * = statistically unstable.



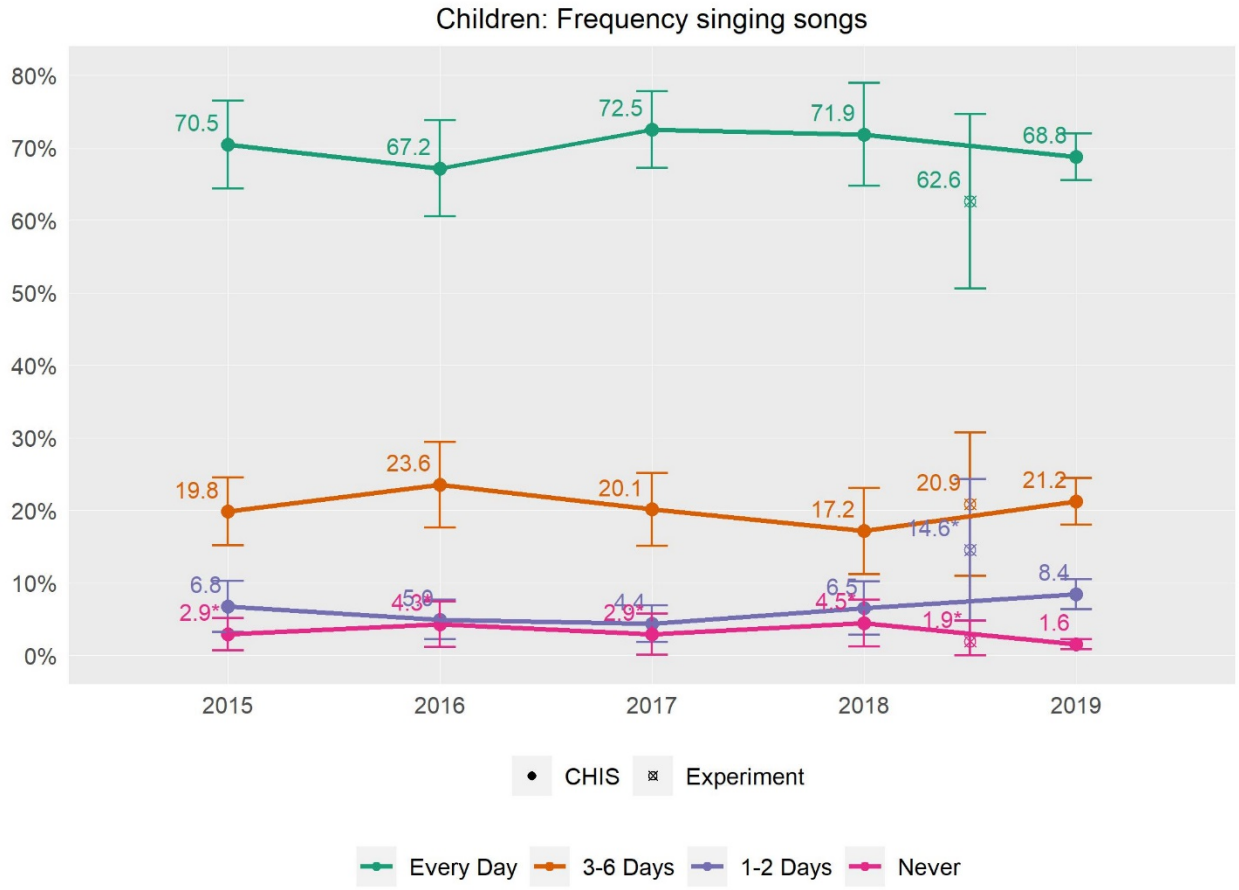

| Overweight for age | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| No | 85.0 (81.4, 88.7) | 83.4 (78.9, 87.9) | 85.5 (81.5, 89.6) | 86.4 (83.2, 89.6) | 85.2 (83.5, 87.0) | 96.1* (92.8, 99.5) |
| Yes | 15.0 (11.3, 18.6) | 16.6 (12.1, 21.1) | 14.5 (10.4, 18.5) | 13.6 (10.4, 16.8) | 14.8 (13.0, 16.5) | 3.9* (0.5, 7.2) |

Note. * = statistically unstable.




| Days per week reading books | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| Every Day | 64.1 (57.3, 70.8) | 62.9 (54.6, 71.1) | 67.3 (59.2, 75.4) | 63.2 (56.1, 70.3) | 63.1 (58.9, 67.3) | 55.3 (43.8, 66.9) |
| 3-6 Days | 25.1 (19.8, 30.4) | 25.0 (19.1, 30.8) | 22.8 (15.8, 29.7) | 19.1 (12.9, 25.2) | 22.7 (19.5, 25.9) | 25.4 (15.4, 35.4) |
| 1-2 Days | 9.2 (5.0, 13.5) | 9.2 (4.9, 13.6) | 7.9 (4.9, 10.9) | 12.8 (7.5, 18.1) | 11.6 (8.9, 14.3) | 17.0* (6.9, 27.0) |
| Never | 1.6* (0.2, 3.0) | 2.9* (0.2, 5.7) | 2.1* (0.1, 4.0) | 4.9* (1.8, 8.0) | 2.6 (1.1, 4.2) | 2.3* (0.0, 5.5) |

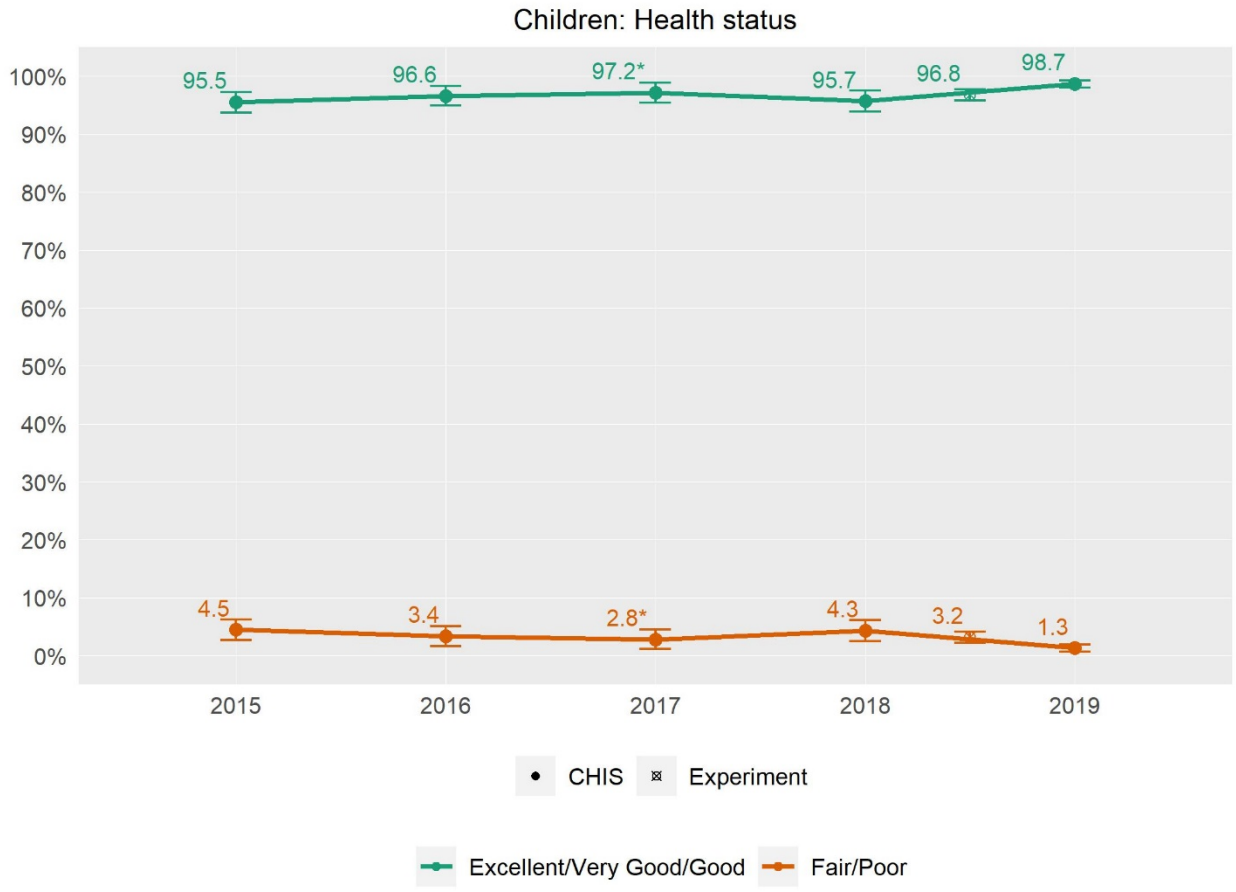
Note. * = statistically unstable.




| Frequency singing songs | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| Every Day | 70.5 (64.4, 76.5) | 67.2 (60.5, 73.8) | 72.5 (67.2, 77.8) | 71.9 (64.8, 78.9) | 68.8 (65.5, 72.0) | 62.6 (50.6, 74.6) |
| 3-6 Days | 19.8 (15.2, 24.5) | 23.6 (17.7, 29.5) | 20.1 (15.2, 25.1) | 17.2 (11.2, 23.1) | 21.2 (18.1, 24.4) | 20.9 (11.0, 30.8) |
| 1-2 Days | 6.8 (3.2, 10.3) | 5.0 (2.2, 7.7) | 4.4 (1.9, 6.9) | 6.5 (2.8, 10.2) | 8.4 (6.4, 10.5) | 14.6* (4.8, 24.3) |
| Never | 2.9* (0.7, 5.2) | 4.3* (1.2, 7.4) | 2.9* (0.1, 5.8) | 4.5* (1.3, 7.7) | 1.6 (0.8, 2.3) | 1.9* (0.0, 4.8) |

Note. * = statistically unstable.

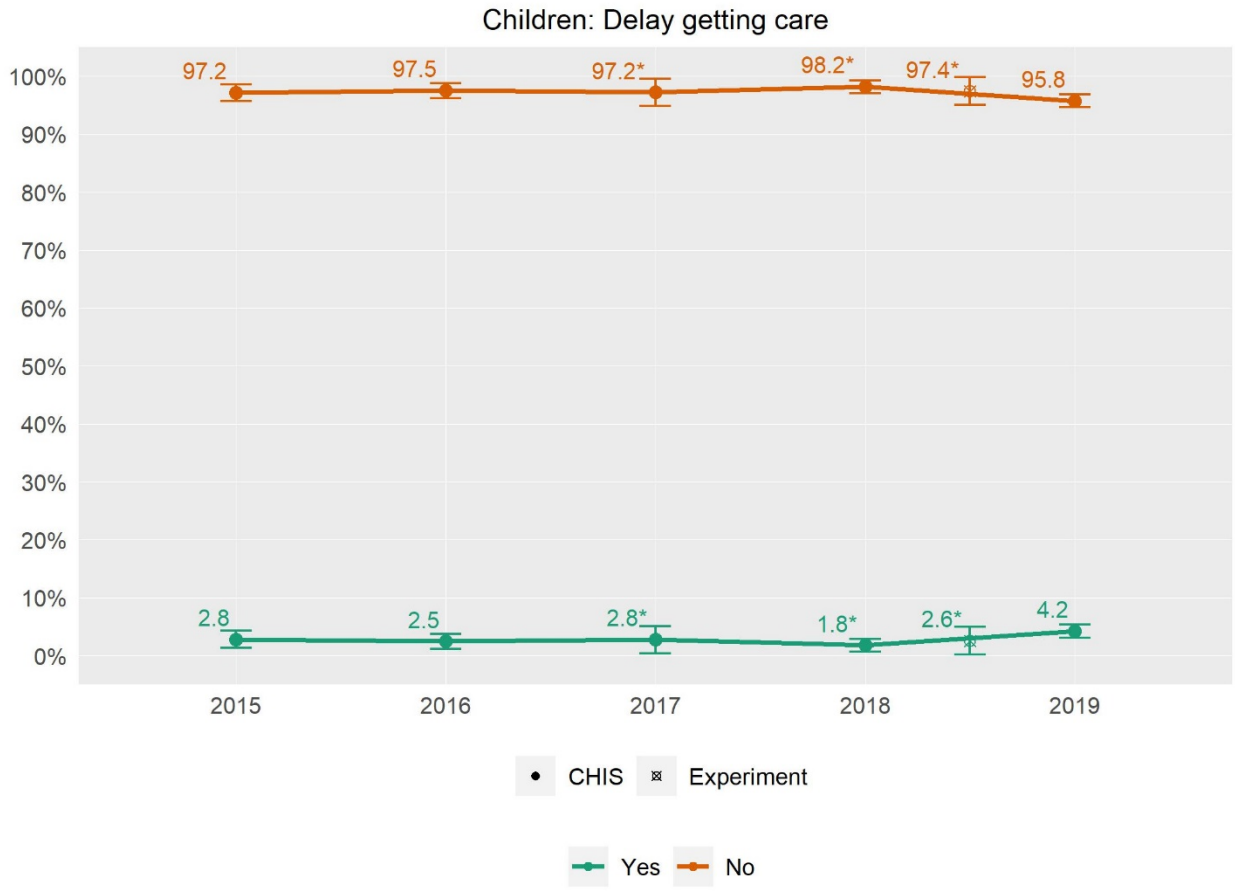
However, there are a number of variables that experience similar differences to those discussed in conjunction with the adult variables. The first we examine is health status of the child as rated by the parent. We see similar increases in the healthier categories comparing 2018 and 2019 though the confidence interval for 2019 does cross with the estimates from 2016 and 2017.




| Health status | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| Excellent/ Very Good/Good | 95.5 (93.8, 97.3) | 96.6 (94.9, 98.3) | 97.2* (95.4, 98.9) | 95.7 (93.9, 97.5) | 98.7 (98.1, 99.3) | 96.8 (95.8, 97.7) |
| Fair/Poor | 4.5 (2.7, 6.2) | 3.4 (1.7, 5.1) | 2.8* (1.1, 4.6) | 4.3 (2.5, 6.1) | 1.3 (0.7, 1.9) | 3.2 (2.3, 4.2) |

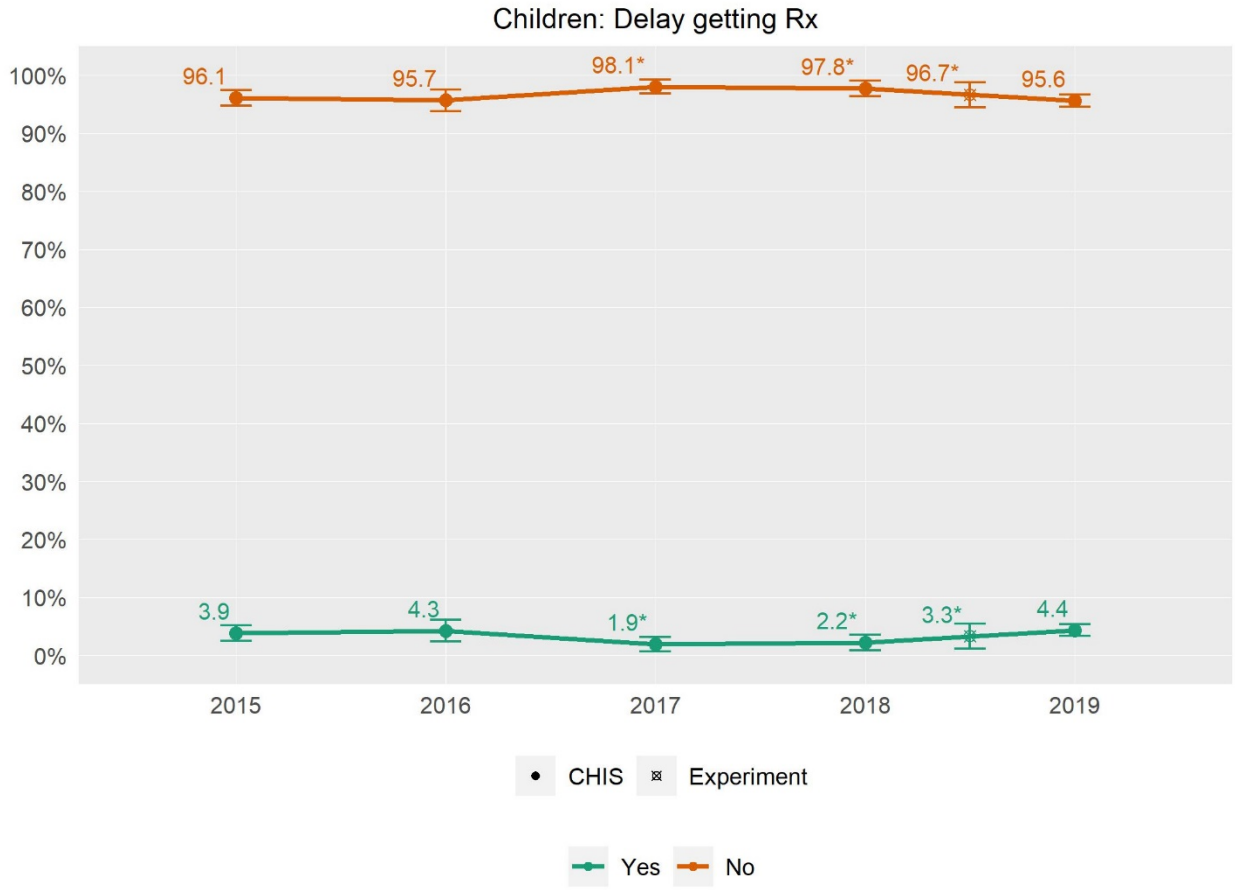
Note. * = statistically unstable.

Similarly we see a difference between 2018 and 2019 in children having delays in receiving health care, but the confidence intervals cross for earlier years with 2019. The 2019 estimate does boast the highest rate of delays in care in recent years. Delays in obtaining prescriptions for a child see a similar pattern also estimating the highest rate of delays in prescriptions in the examined time frame.




| Delay getting care | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| No | 97.2 (95.7, 98.6) | 97.5 (96.2, 98.8) | 97.2* (94.9, 99.6) | 98.2* (97.1, 99.3) | 95.8 (94.6, 96.9) | 97.4* (95.0, 99.8) |
| Yes | 2.8 (1.4, 4.3) | 2.5 (1.2, 3.8) | 2.8* (0.4, 5.1) | 1.8* (0.7, 2.9) | 4.2 (3.1, 5.4) | 2.6* (0.2, 5.0) |

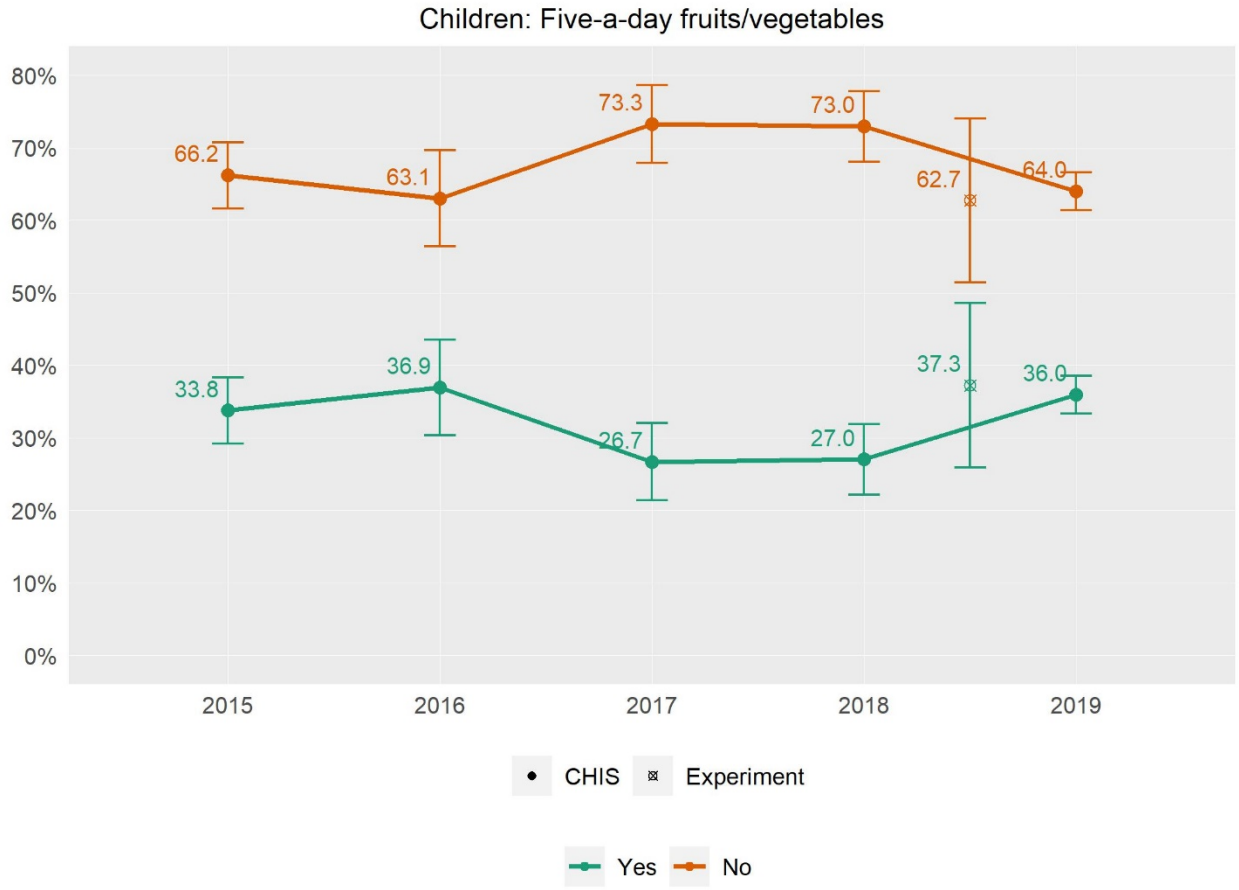
Note. * = statistically unstable.




| Delay getting Rx | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| No | 96.1 (94.8, 97.5) | 95.7 (93.8, 97.6) | 98.1* (96.8, 99.3) | 97.8* (96.4, 99.1) | 95.6 (94.6, 96.7) | 96.7* (94.5, 98.8) |
| Yes | 3.9 (2.5, 5.2) | 4.3 (2.4, 6.2) | 1.9* (0.7, 3.2) | 2.2* (0.9, 3.6) | 4.4 (3.3, 5.4) | 3.3* (1.2, 5.5) |

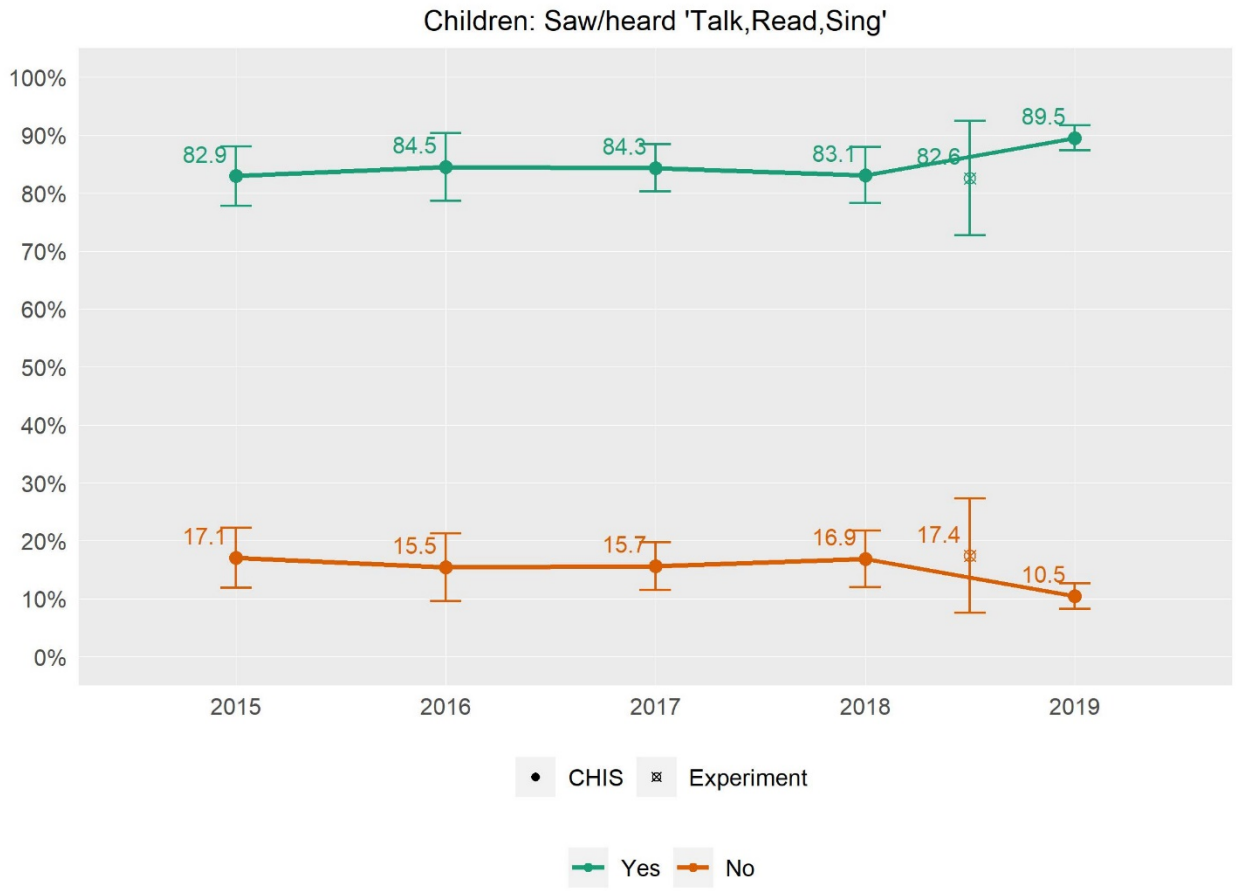
Note. * = statistically unstable.

Regarding a child at least 2 years of age achieving the recommended five-a-day fruits and vegetables, the 2019 estimate is more in line with 2015-2016 estimates than the 2017-2018 estimates. The confidence intervals for those cycles do not cross, but 2019 displays the smallest standard errors and resulting confidence intervals.




| Five-a-day fruits/vegetables | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| No | 66.2 (61.7, 70.8) | 63.1 (56.4, 69.7) | 73.3 (67.9, 78.6) | 73.0 (68.1, 77.8) | 64.0 (61.4, 66.6) | 62.7 (51.4, 74.1) |
| Yes | 33.8 (29.2, 38.3) | 36.9 (30.3, 43.6) | 26.7 (21.4, 32.1) | 27.0 (22.2, 31.9) | 36.0 (33.4, 38.6) | 37.3 (25.9, 48.6) |

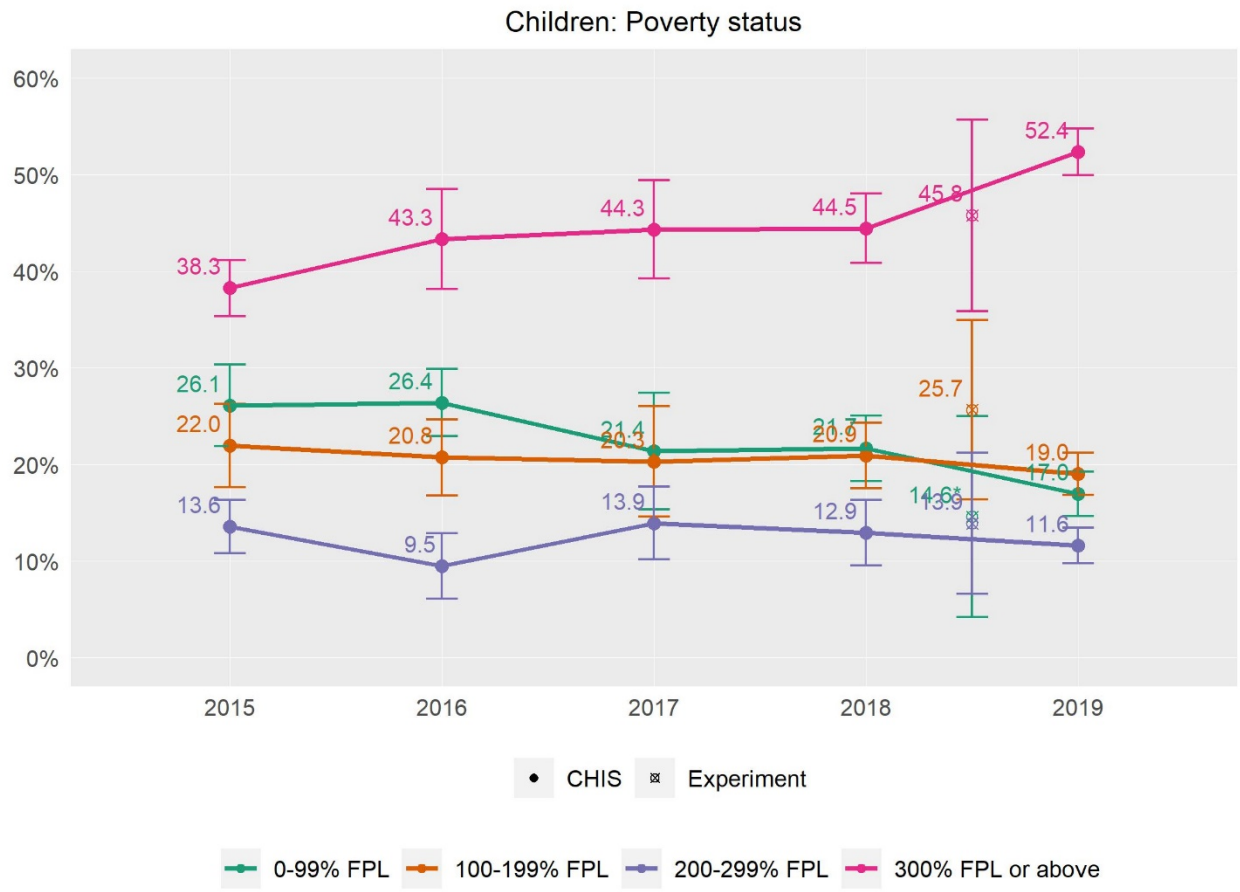
Regarding First 5 California's "Talk, Read, Sing" program[10], we see an increase in exposure going from a up to nearly 90% in 2019 from the 83% average in the previous two cycles. However, the confidence intervals for 2019 do overlap with previous years.




| Saw/heard 'Talk,Read,Sing' | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| Yes | 82.9 (77.8, 88.1) | 84.5 (78.7, 90.4) | 84.3 (80.3, 88.4) | 83.1 (78.3, 88.0) | 89.5 (87.4, 91.7) | 82.6 (72.7, 92.4) |
| No | 17.1 (11.9, 22.2) | 15.5 (9.6, 21.3) | 15.7 (11.6, 19.7) | 16.9 (12.0, 21.7) | 10.5 (8.3, 12.6) | 17.4 (7.6, 27.3) |

[10] Asked of households with children with at least one child under the age of 5.

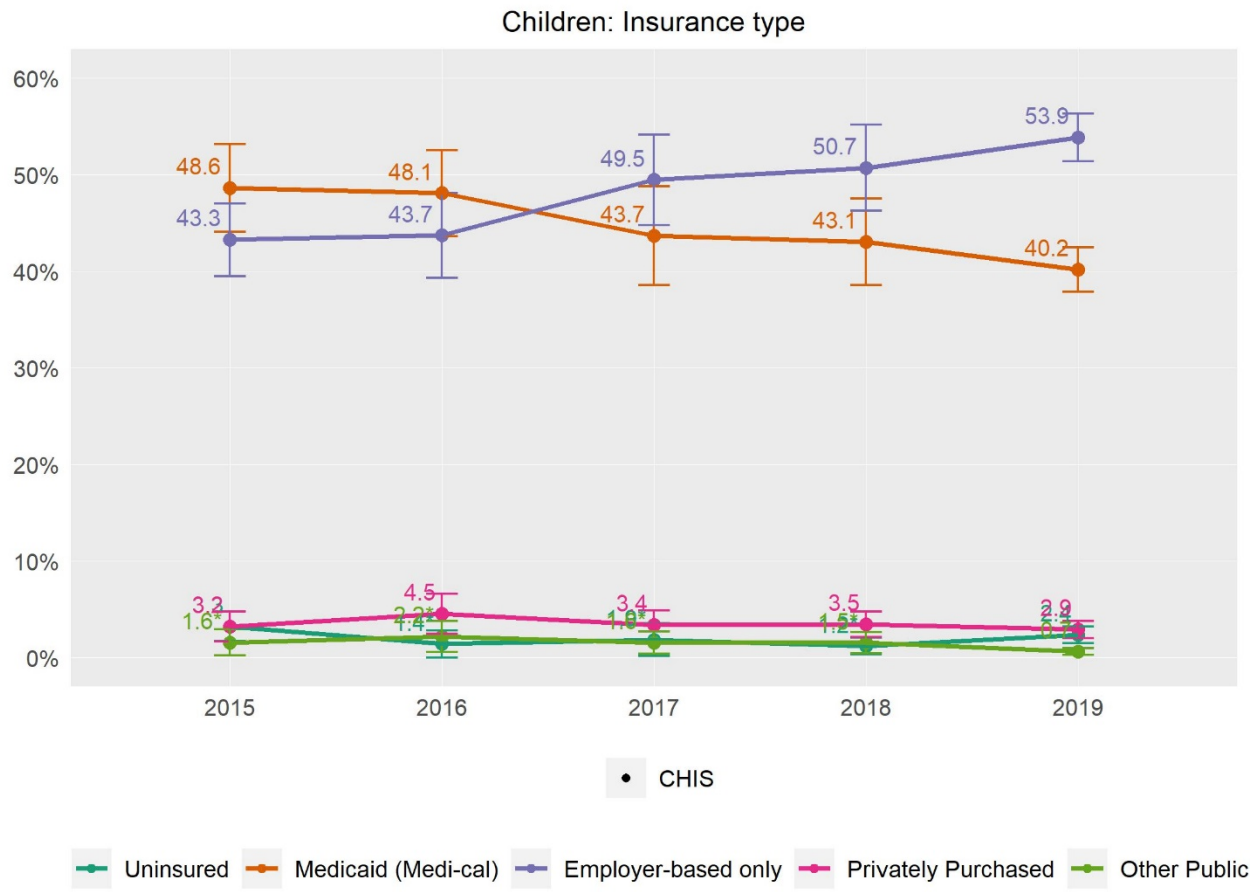
Poverty status changes reflect what was observed in the adult survey with the largest gains in the 300% FPL grouping.




| Poverty status | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 | Web Experiment |
|---|---|---|---|---|---|---|
| 0-99% FPL | 26.1 (21.9, 30.4) | 26.4 (22.9, 29.9) | 21.4 (15.3, 27.4) | 21.7 (18.3, 25.1) | 17.0 (14.7, 19.3) | 14.6* (4.2, 25.0) |
| 100-199% FPL | 22.0 (17.7, 26.3) | 20.8 (16.8, 24.7) | 20.3 (14.6, 26.0) | 20.9 (17.6, 24.3) | 19.0 (16.9, 21.2) | 25.7 (16.4, 34.9) |
| 200-299% FPL | 13.6 (10.8, 16.4) | 9.5 (6.1, 12.9) | 13.9 (10.2, 17.7) | 12.9 (9.5, 16.3) | 11.6 (9.8, 13.4) | 13.9 (6.6, 21.2) |
| 300% FPL or above | 38.3 (35.4, 41.2) | 43.3 (38.2, 48.5) | 44.3 (39.3, 49.4) | 44.5 (40.9, 48.1) | 52.4 (49.9, 54.8) | 45.8 (35.9, 55.7) |

Note. * = statistically unstable.

Again, we observe similar increases in employer-based insurance like with adult survey with drops in Medicaid (Medi-Cal).



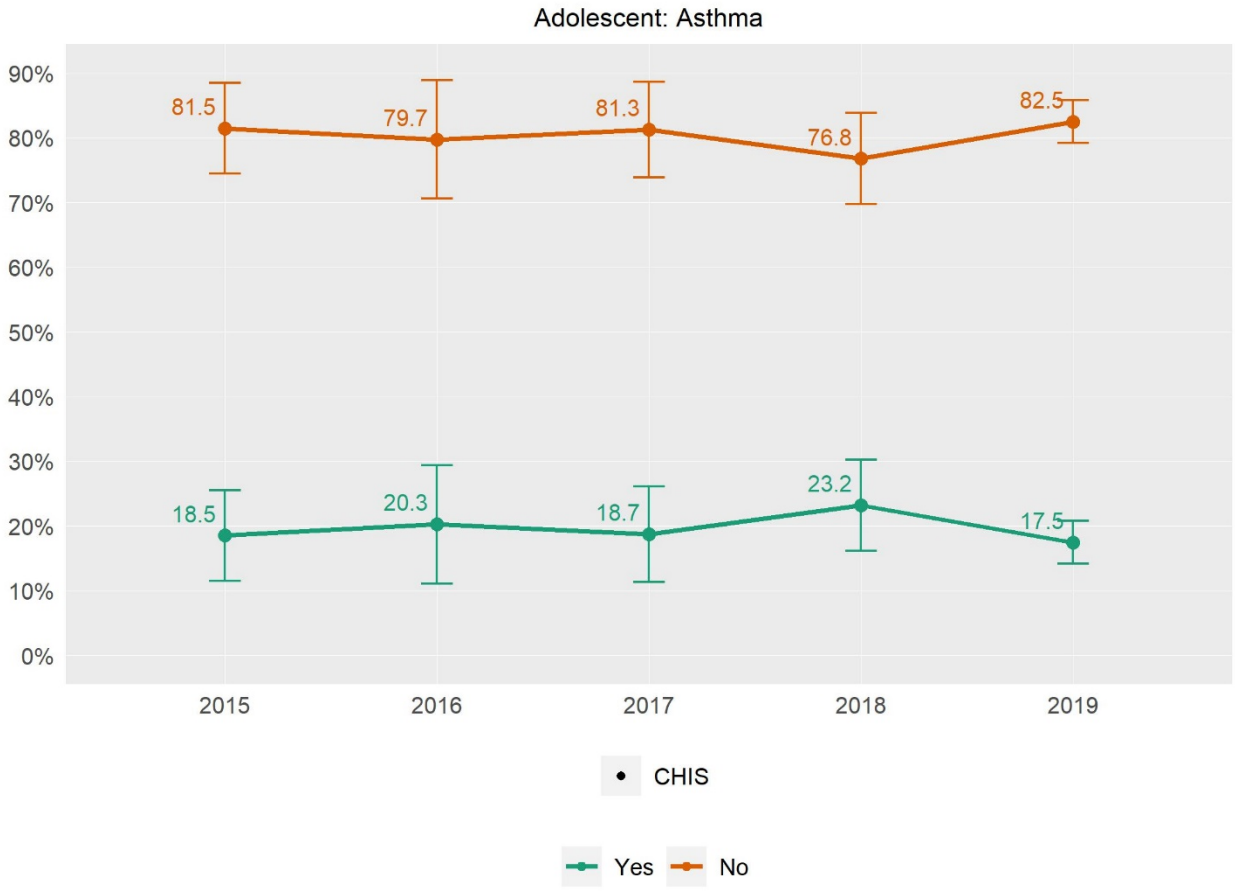

| Insurance type | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 |
|---|---|---|---|---|---|
| Employer-based only | 43.3 (39.5, 47.0) | 43.7 (39.3, 48.1) | 49.5 (44.8, 54.2) | 50.7 (46.3, 55.2) | 53.9 (51.4, 56.3) |
| Medicaid (Medi-Cal) | 48.6 (44.1, 53.2) | 48.1 (43.6, 52.6) | 43.7 (38.6, 48.8) | 43.1 (38.6, 47.5) | 40.2 (37.9, 42.5) |
| Privately Purchased | 3.2 (1.7, 4.8) | 4.5 (2.5, 6.6) | 3.4 (1.9, 4.9) | 3.5 (2.1, 4.8) | 2.9 (2.0, 3.8) |
| Other Public | 1.6* (0.2, 2.9) | 2.2* (0.6, 3.8) | 1.6* (0.4, 2.7) | 1.5* (0.4, 2.7) | 0.7 (0.3, 1.0) |
| Uninsured | 3.3 (1.7, 4.8) | 1.4* (0.0, 2.8) | 1.9* (0.2, 3.6) | 1.2* (0.3, 2.1) | 2.4 (1.5, 3.2) |

Note. * = statistically unstable.

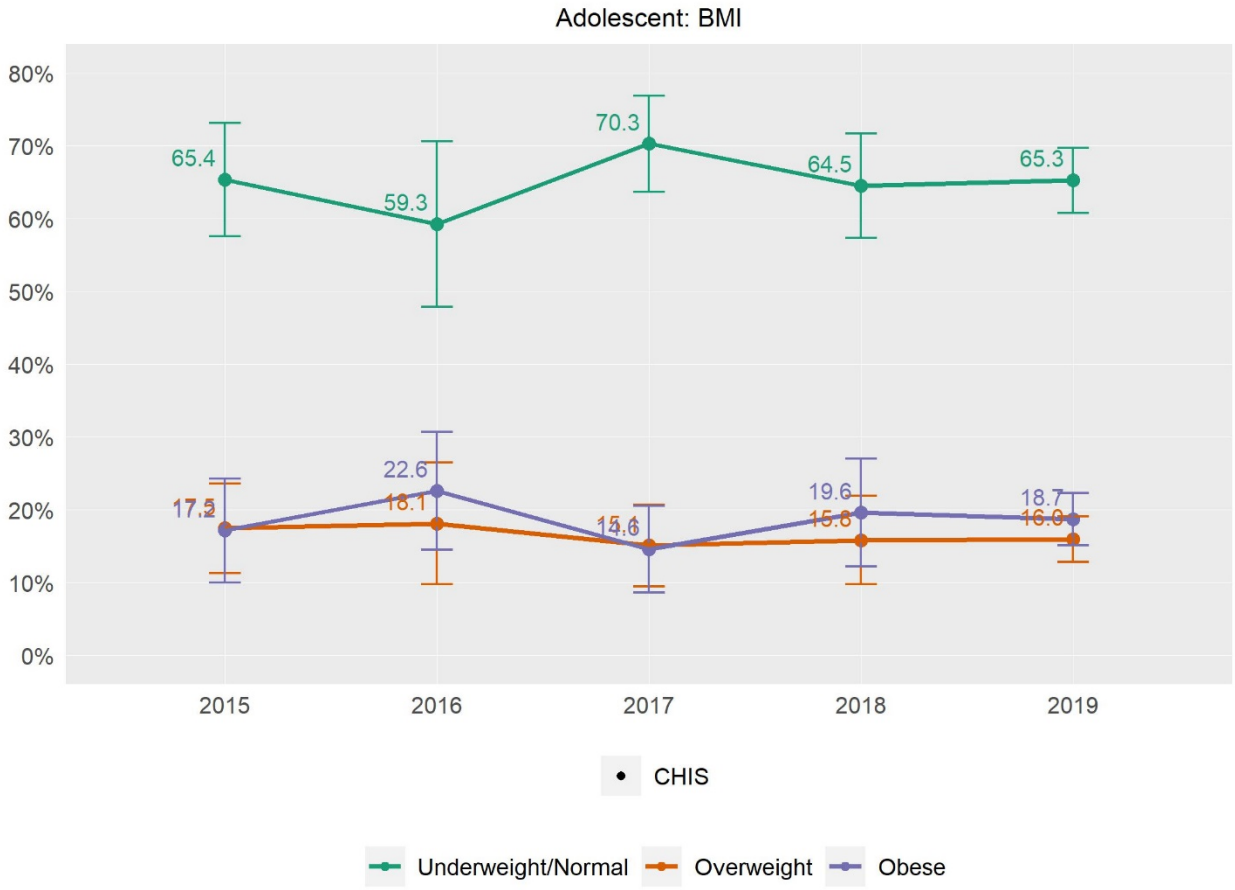
***Adolescent Trend Analysis: 2015-2019***

Finally, we examine trends for the adolescent sample. The following plots and tables do not include estimates from the Fall web experiment given the small sample sizes obtained.

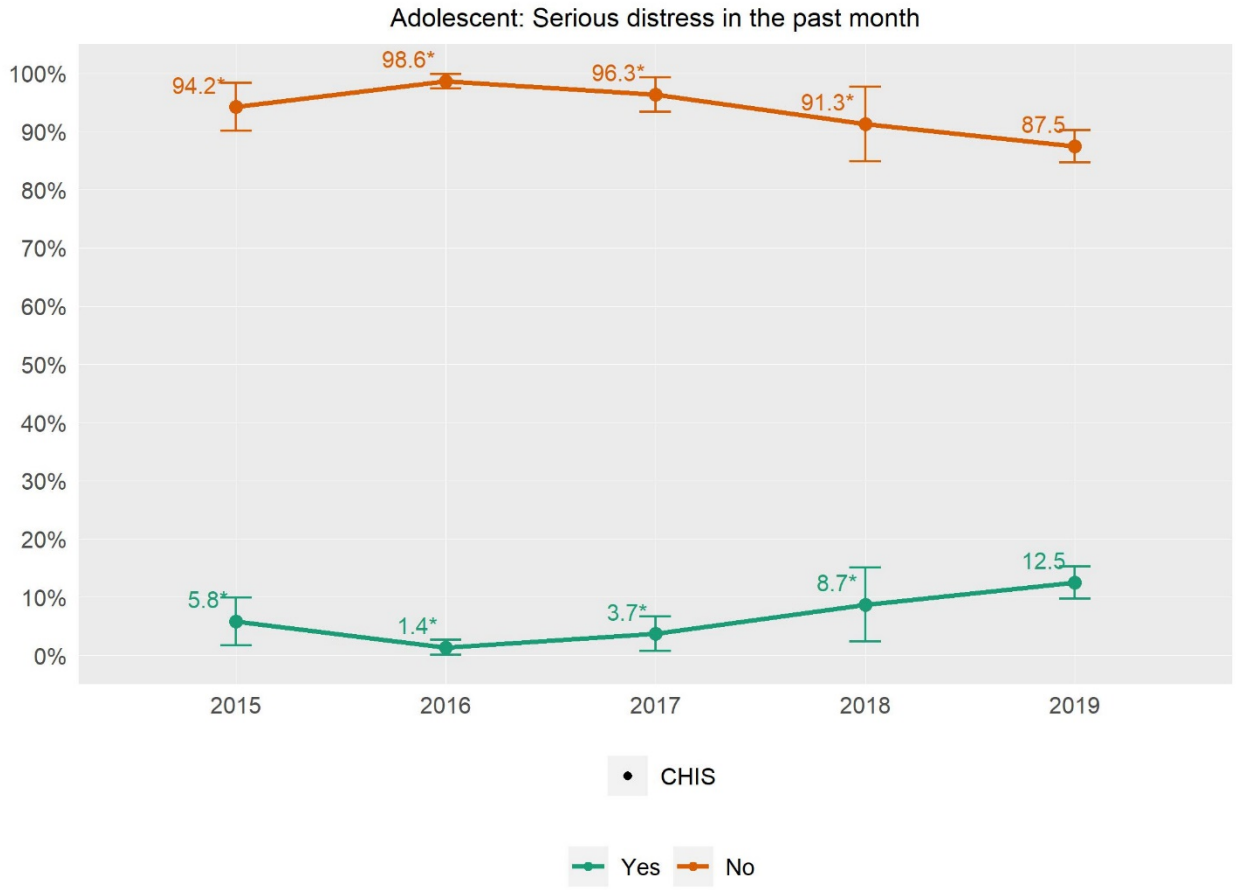
Similar to the child estimates, there is a degree of consistency with a number of adolescent variables including asthma, BMI, serious psychological distress in past month, five-a-day fruits and vegetables, and delay getting care and prescriptions.




| Asthma | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 |
|---|---|---|---|---|---|
| No | 81.5 | 79.7 | 81.3 | 76.8 | 82.5 |
| | (74.5, 88.5) | (70.6, 88.9) | (73.9, 88.6) | (69.7, 83.8) | (79.2, 85.8) |
| Yes | 18.5 | 20.3 | 18.7 | 23.2 | 17.5 |
| | (11.5, 25.5) | (11.1, 29.4) | (11.4, 26.1) | (16.2, 30.3) | (14.2, 20.8) |

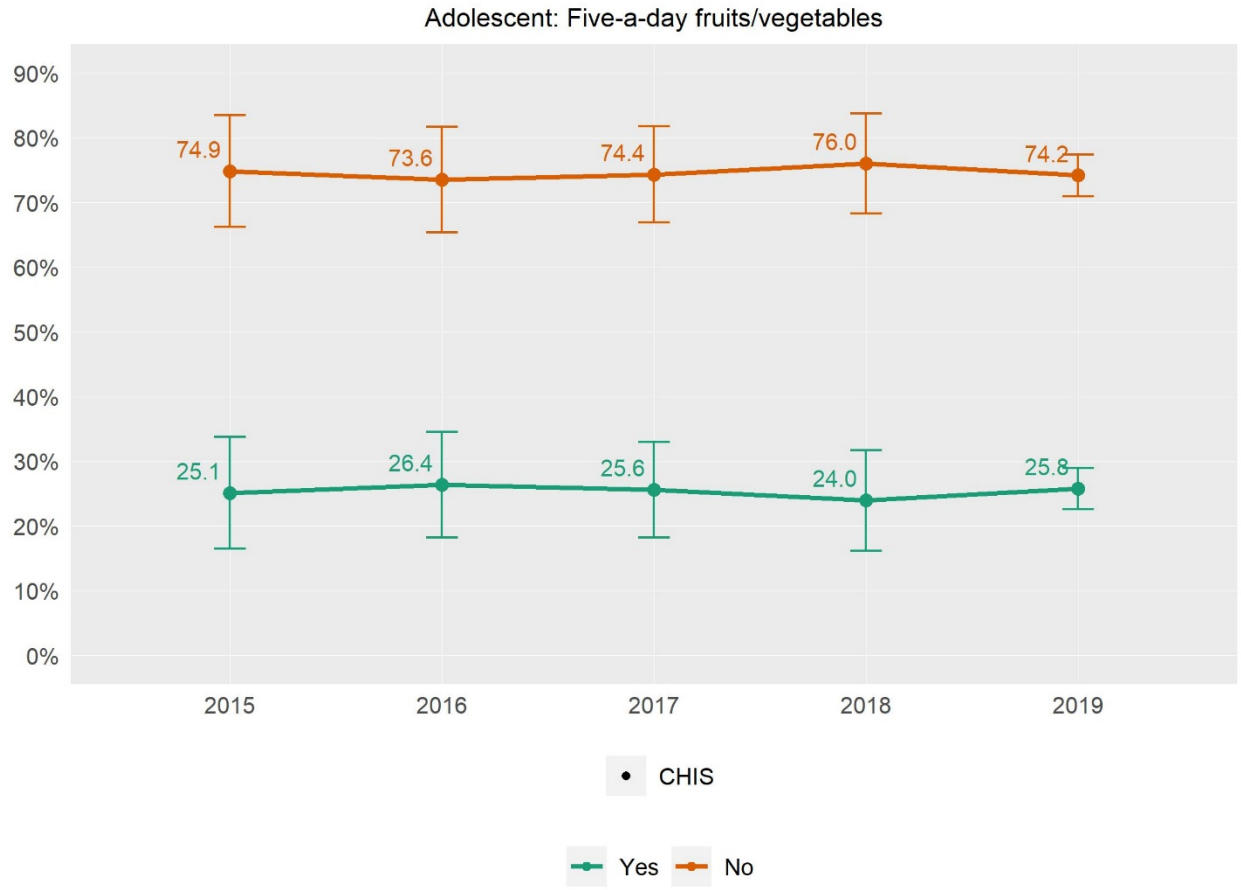



| Body mass index | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 |
|---|---|---|---|---|---|
| Underweight/Normal | 65.4 (57.6, 73.2) | 59.3 (47.9, 70.6) | 70.3 (63.7, 76.9) | 64.5 (57.3, 71.8) | 65.3 (60.8, 69.8) |
| Overweight | 17.5 (11.3, 23.6) | 18.1 (9.8, 26.5) | 15.1 (9.4, 20.7) | 15.8 (9.8, 21.9) | 16.0 (12.8, 19.1) |
| Obese | 17.2 (10.0, 24.3) | 22.6 (14.5, 30.7) | 14.6 (8.6, 20.6) | 19.6 (12.2, 27.0) | 18.7 (15.1, 22.3) |

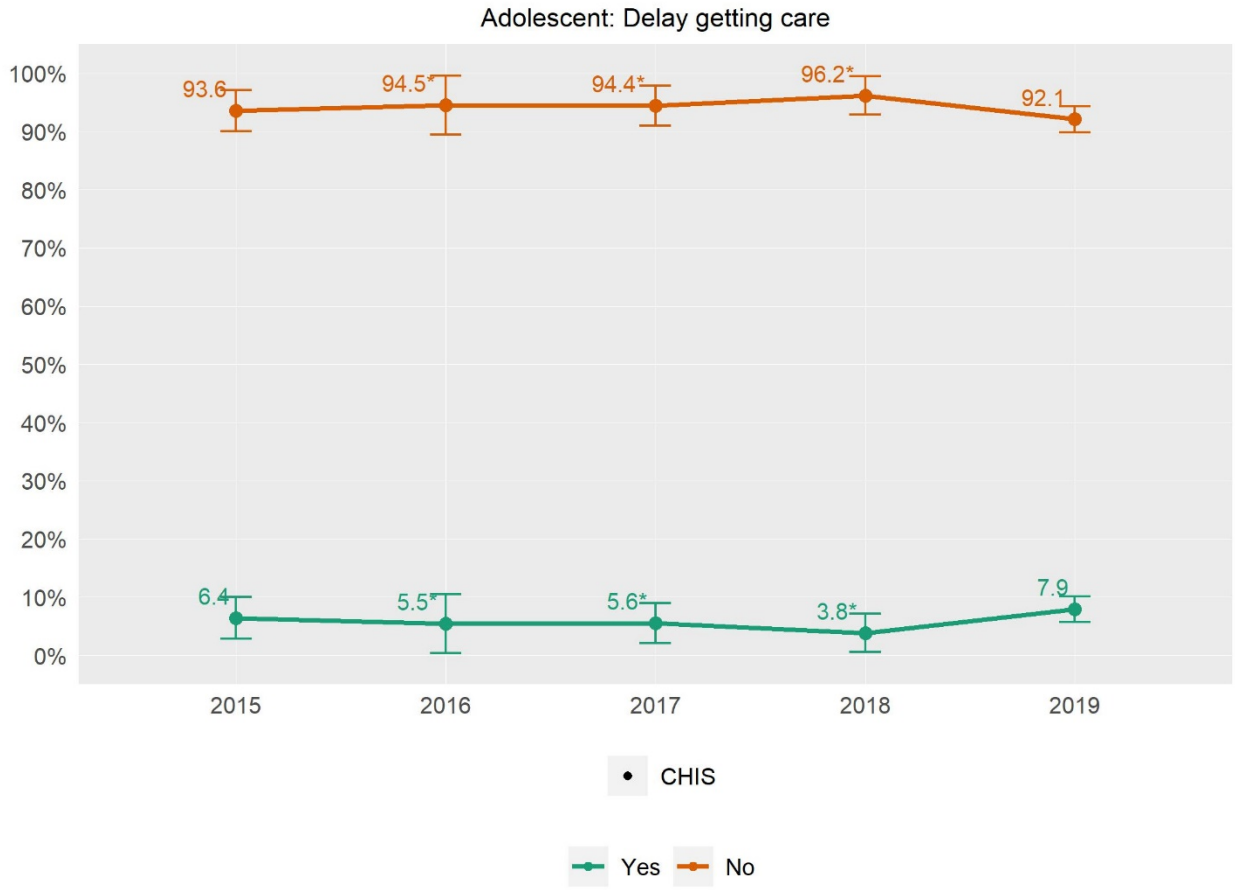



| Serious distress in past month | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 |
|---|---|---|---|---|---|
| No | 94.2* | 98.6* | 96.3* | 91.3* | 87.5 |
| | (90.1, 98.3) | (97.4, 99.9) | (93.3, 99.3) | (84.9, 97.6) | (84.7, 90.2) |
| Yes | 5.8* | 1.4* | 3.7* | 8.7* | 12.5 |
| | (1.7, 9.9) | (0.1, 2.6) | (0.7, 6.7) | (2.4, 15.1) | (9.8, 15.3) |

Note. * = statistically unstable.

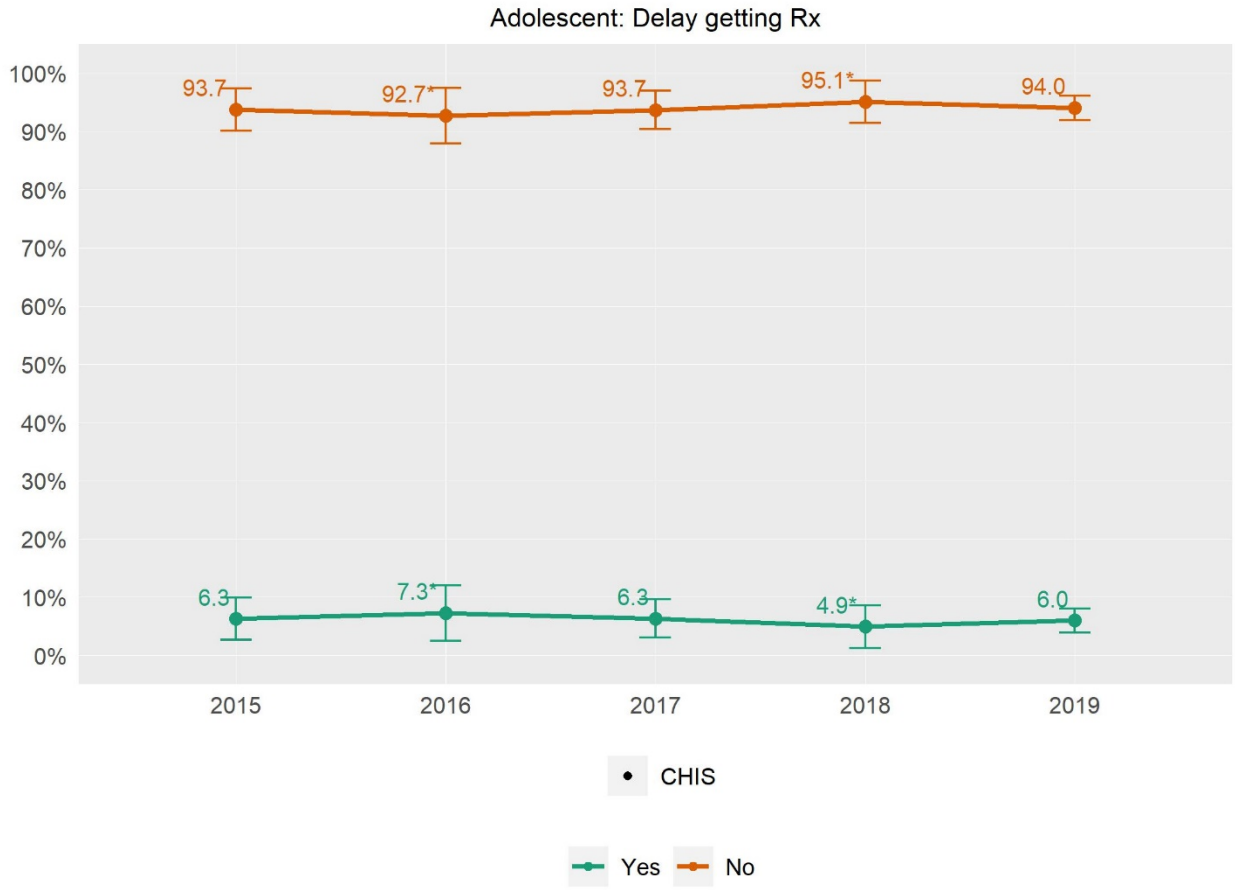



| Five-a-day fruits/vegetables | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 |
|---|---|---|---|---|---|
| No | 74.9 | 73.6 | 74.4 | 76.0 | 74.2 |
| | (66.2, 83.5) | (65.4, 81.7) | (67.0, 81.8) | (68.3, 83.8) | (71.0, 77.4) |
| Yes | 25.1 | 26.4 | 25.6 | 24.0 | 25.8 |
| | (16.5, 33.8) | (18.3, 34.6) | (18.2, 33.0) | (16.2, 31.7) | (22.6, 29.0) |




| Delay getting care | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 |
|---|---|---|---|---|---|
| No | 93.6 | 94.5* | 94.4* | 96.2* | 92.1 |
| | (90.0, 97.1) | (89.5, 99.6) | (91.0, 97.9) | (92.9, 99.5) | (89.9, 94.3) |
| Yes | 6.4 | 5.5* | 5.6* | 3.8* | 7.9 |
| | (2.9, 10.0) | (0.4, 10.5) | (2.1, 9.0) | (0.5, 7.1) | (5.7, 10.1) |

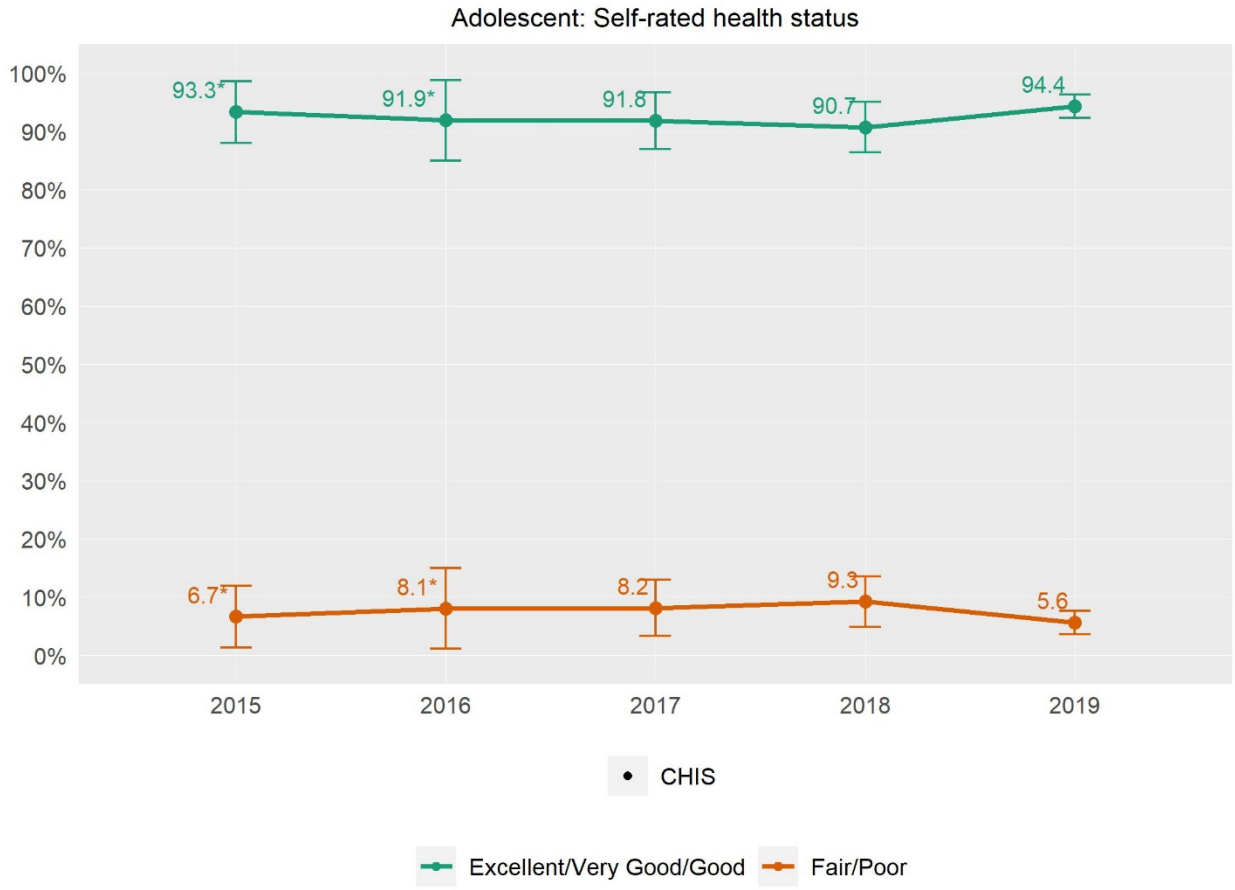
Note. * = statistically unstable.




| Delay getting Rx | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 |
|---|---|---|---|---|---|
| No | 93.7 | 92.7* | 93.7 | 95.1* | 94.0 |
| | (90.1, 97.4) | (88.0, 97.5) | (90.4, 97.0) | (91.4, 98.7) | (91.9, 96.1) |
| Yes | 6.3 | 7.3* | 6.3 | 4.9* | 6.0 |
| | (2.6, 9.9) | (2.5, 12.0) | (3.0, 9.6) | (1.3, 8.6) | (3.9, 8.1) |

Note. * = statistically unstable.

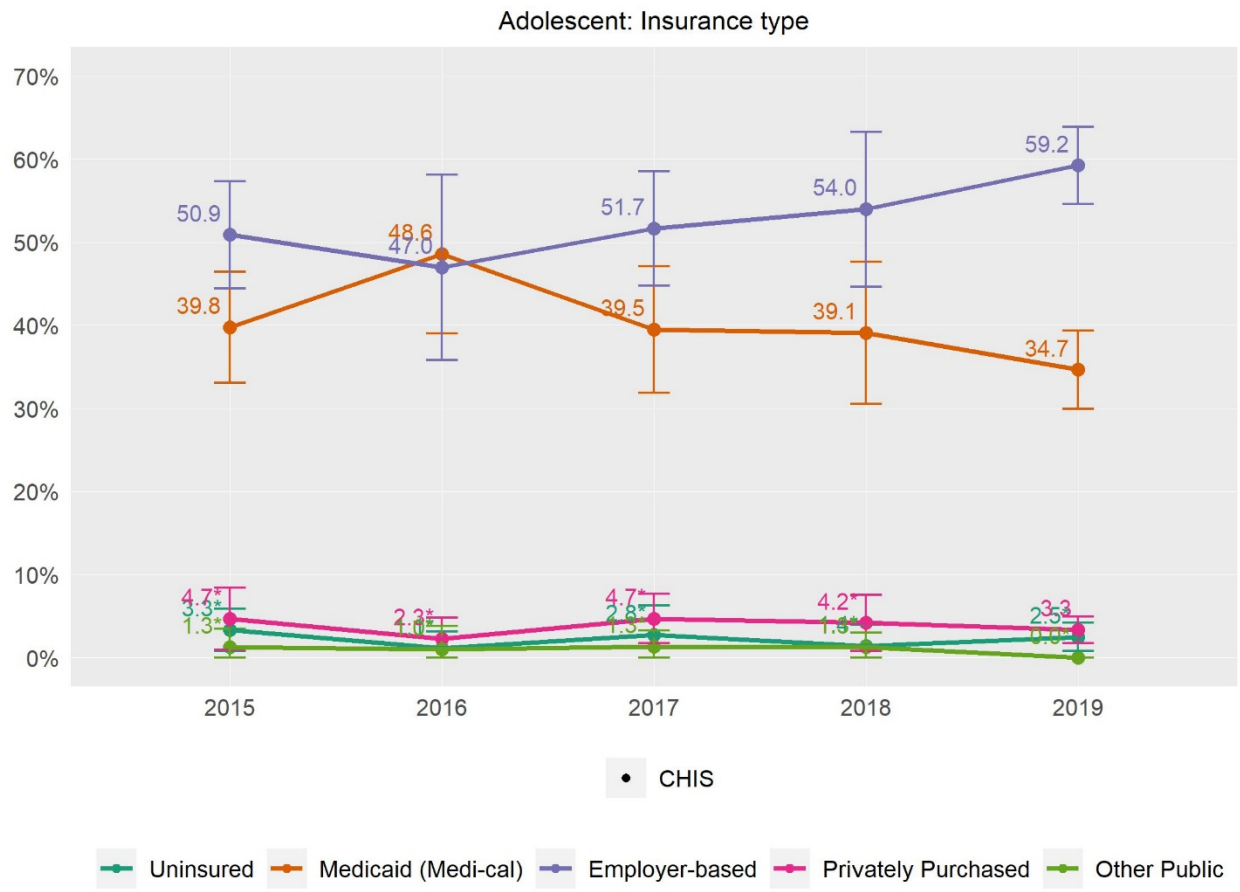
Like with adult self-rated health, we see an increase in adolescents expressing either "excellent", "very good", or "good" statuses from 2018 to 2019, though the confidence intervals across the years are all consistent suggesting less of an impact on adolescents than adults and children via adult proxy.




| Self-rated health | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 |
|---|---|---|---|---|---|
| Excellent/Very Good/Good | 93.3* | 91.9* | 91.8 | 90.7 | 94.4 |
| | (88.0, 98.6) | (85.0, 98.9) | (87.0, 96.7) | (86.4, 95.1) | (92.4, 96.4) |
| Fair/Poor | 6.7* | 8.1* | 8.2 | 9.3 | 5.6 |
| | (1.4, 12.0) | (1.1, 15.0) | (3.3, 13.0) | (4.9, 13.6) | (3.6, 7.6) |

Note. * = statistically unstable.

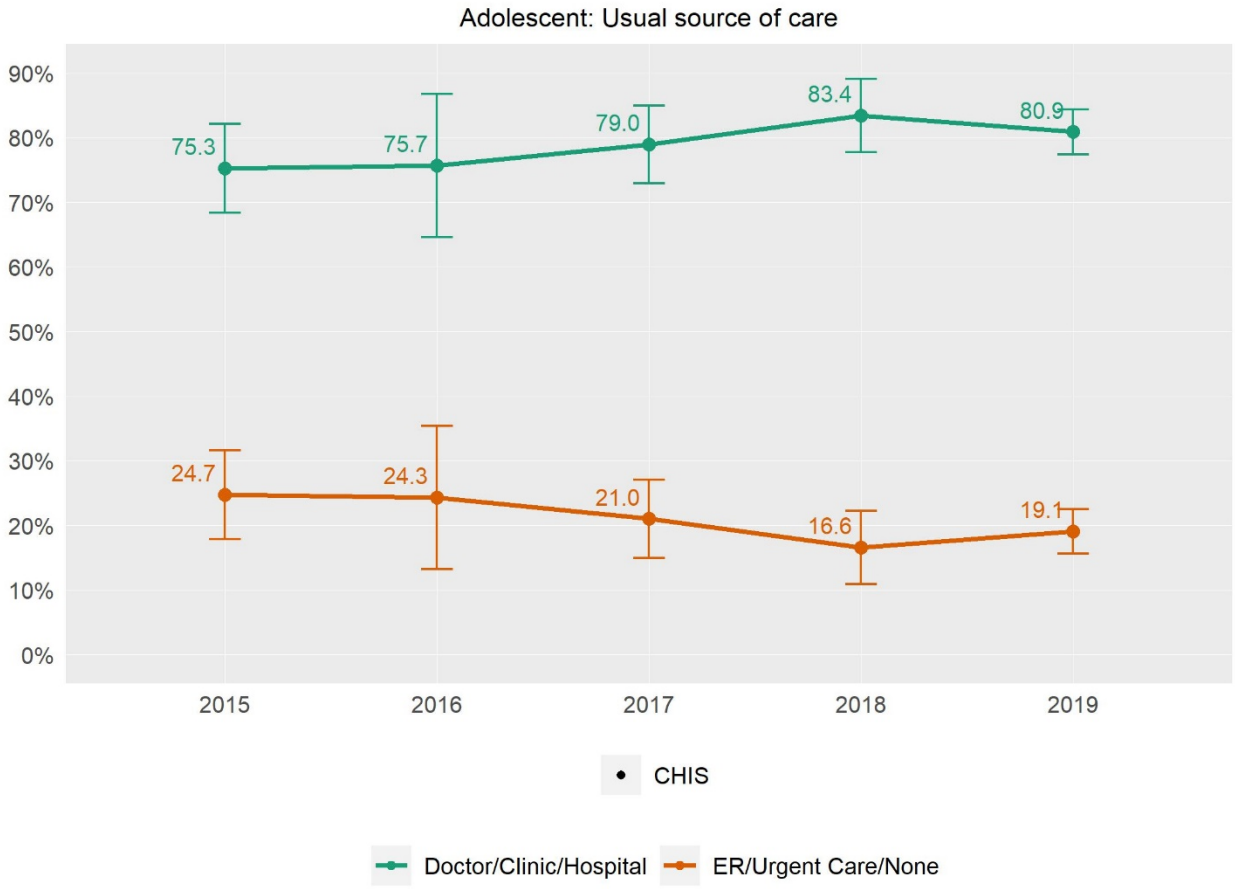
Like with the adult and child estimates of insurance type, we see similar increases in employer-based insurance with a corresponding drop in Medicaid (Medi-Cal).




| Insurance type | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 |
|---|---|---|---|---|---|
| Employer-based | 50.9 | 47.0 | 51.7 | 54.0 | 59.2 |
| | (44.5, 57.3) | (35.8, 58.2) | (44.8, 58.6) | (44.7, 63.3) | (54.6, 63.9) |
| Medicaid (Medi-Cal) | 39.8 | 48.6 | 39.5 | 39.1 | 34.7 |
| | (33.1, 46.4) | (39.0, 58.2) | (31.9, 47.1) | (30.5, 47.6) | (29.9, 39.4) |
| Privately Purchased | 4.7* | 2.3* | 4.7* | 4.2* | 3.3 |
| | (1.0, 8.4) | (0.0, 4.8) | (1.7, 7.7) | (0.8, 7.6) | (1.7, 4.9) |
| Other Public | 1.3* | 1.0* | 1.3* | 1.3* | - |
| | (0.0, 3.5) | (0.0, 3.8) | (0.0, 3.3) | (0.0, 3.0) | - |
| Uninsured | 3.3* | 1.1* | 2.8* | 1.4* | 2.5* |
| | (0.8, 5.9) | (0.0, 3.2) | (0.0, 6.3) | (0.0, 3.9) | (0.8, 4.2) |

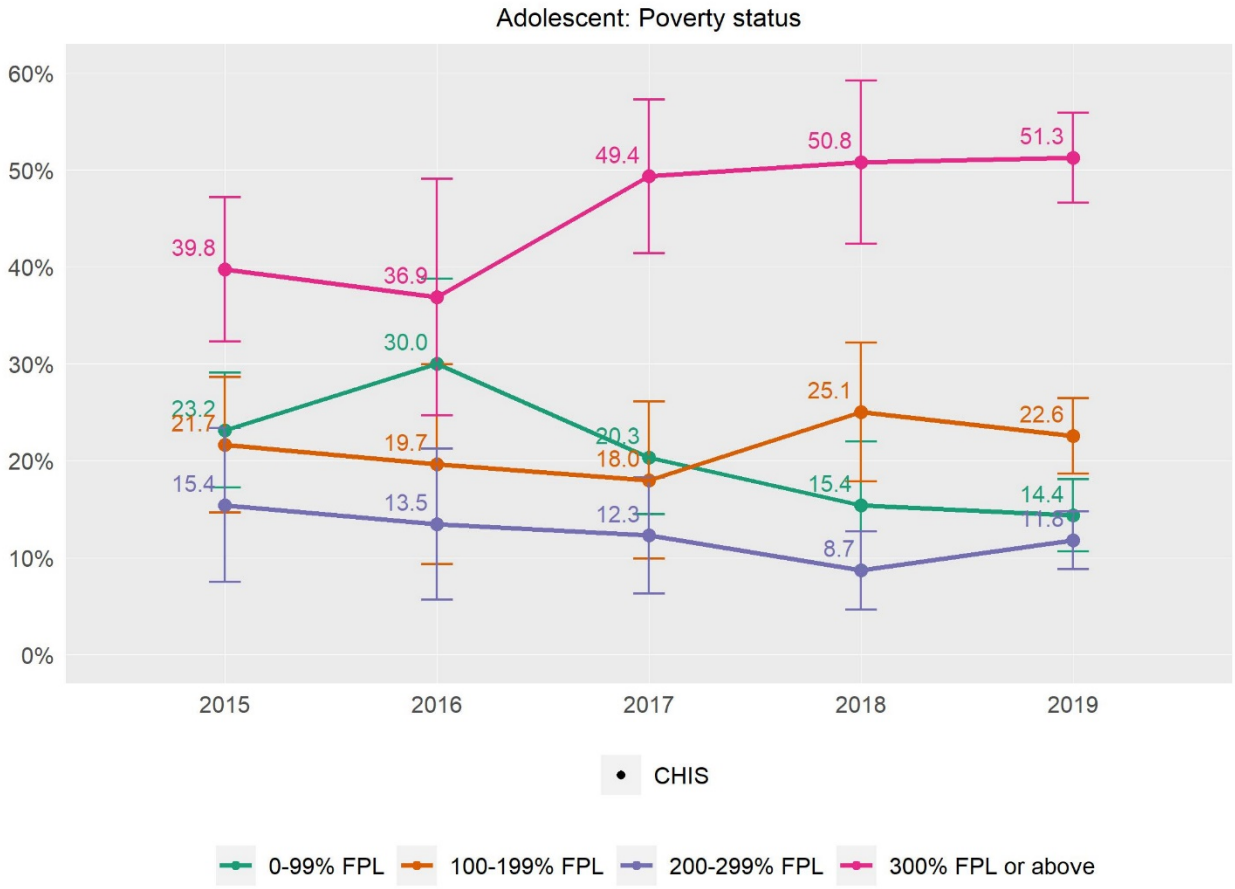
Note. * = statistically unstable. -- = suppressed due to small sample size.

An adolescent having a doctor's office, clinic, or hospital as their usual source of care seemed to stabilize in 2019 from earlier years at 80.9%, which sits in between 79.0% in 2017 and 83.4% in 2018.



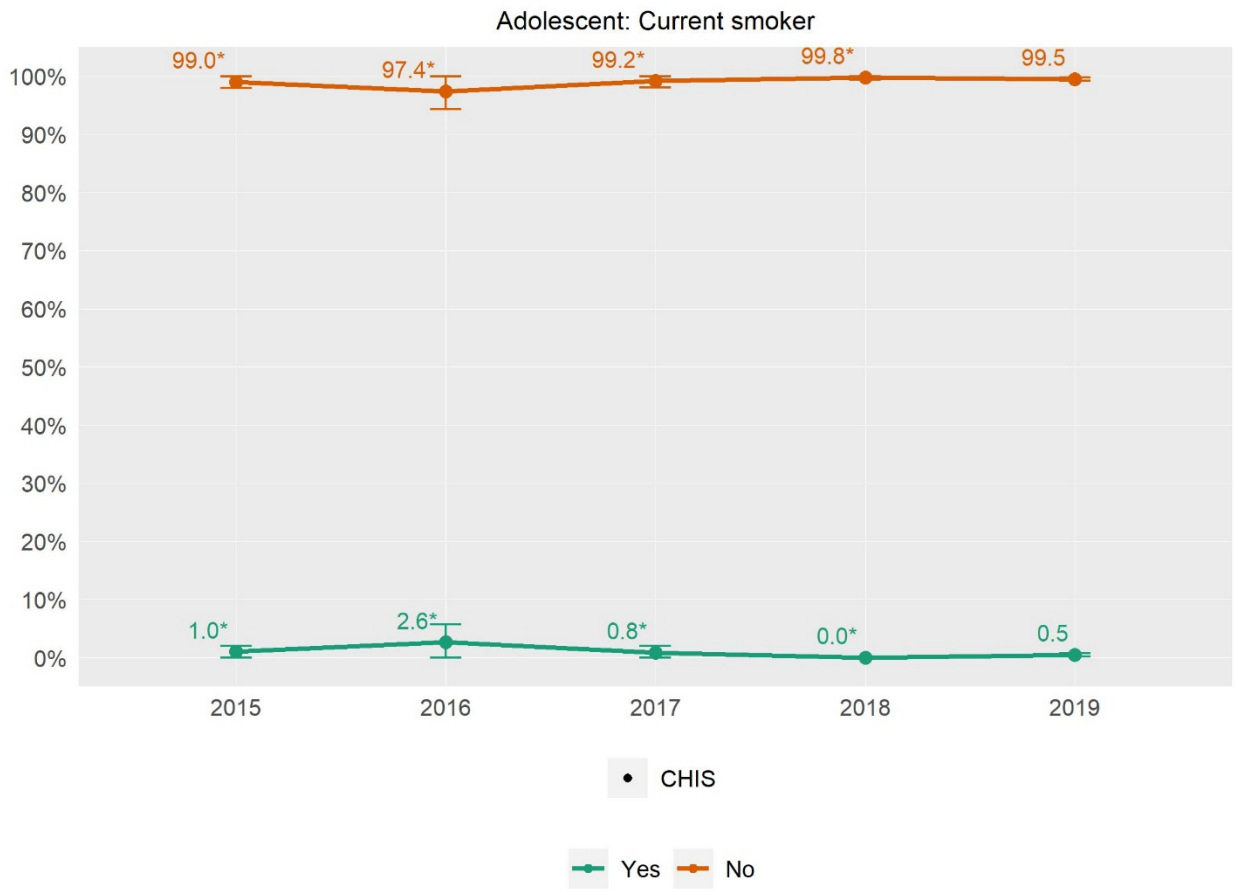

| Usual source of care | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 |
|---|---|---|---|---|---|
| Doctor/Clinic/Hospital | 75.3 (68.4, 82.2) | 75.7 (64.6, 86.8) | 79.0 (72.9, 85.0) | 83.4 (77.8, 89.1) | 80.9 (77.5, 84.4) |
| ER/Urgent Care/None | 24.7 (17.8, 31.6) | 24.3 (13.2, 35.4) | 21.0 (15.0, 27.1) | 16.6 (10.9, 22.2) | 19.1 (15.6, 22.5) |

We see that FPL for adolescents is generally consistent with estimates for CHIS 2018 breaking from the trends observed in the adult and child surveys.




| Poverty status | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 |
|---|---|---|---|---|---|
| 0-99% FPL | 23.2 (17.2, 29.1) | 30.0 (21.3, 38.8) | 20.3 (14.5, 26.2) | 15.4 (8.9, 22.0) | 14.4 (10.6, 18.1) |
| 100-199% FPL | 21.7 (14.7, 28.6) | 19.7 (9.4, 29.9) | 18.0 (9.9, 26.1) | 25.1 (17.9, 32.2) | 22.6 (18.7, 26.5) |
| 200-299% FPL | 15.4 (7.5, 23.4) | 13.5 (5.7, 21.3) | 12.3 (6.3, 18.3) | 8.7 (4.7, 12.7) | 11.8 (8.8, 14.8) |
| 300% FPL or above | 39.8 (32.3, 47.2) | 36.9 (24.7, 49.1) | 49.4 (41.4, 57.3) | 50.8 (42.4, 59.2) | 51.3 (46.6, 55.9) |

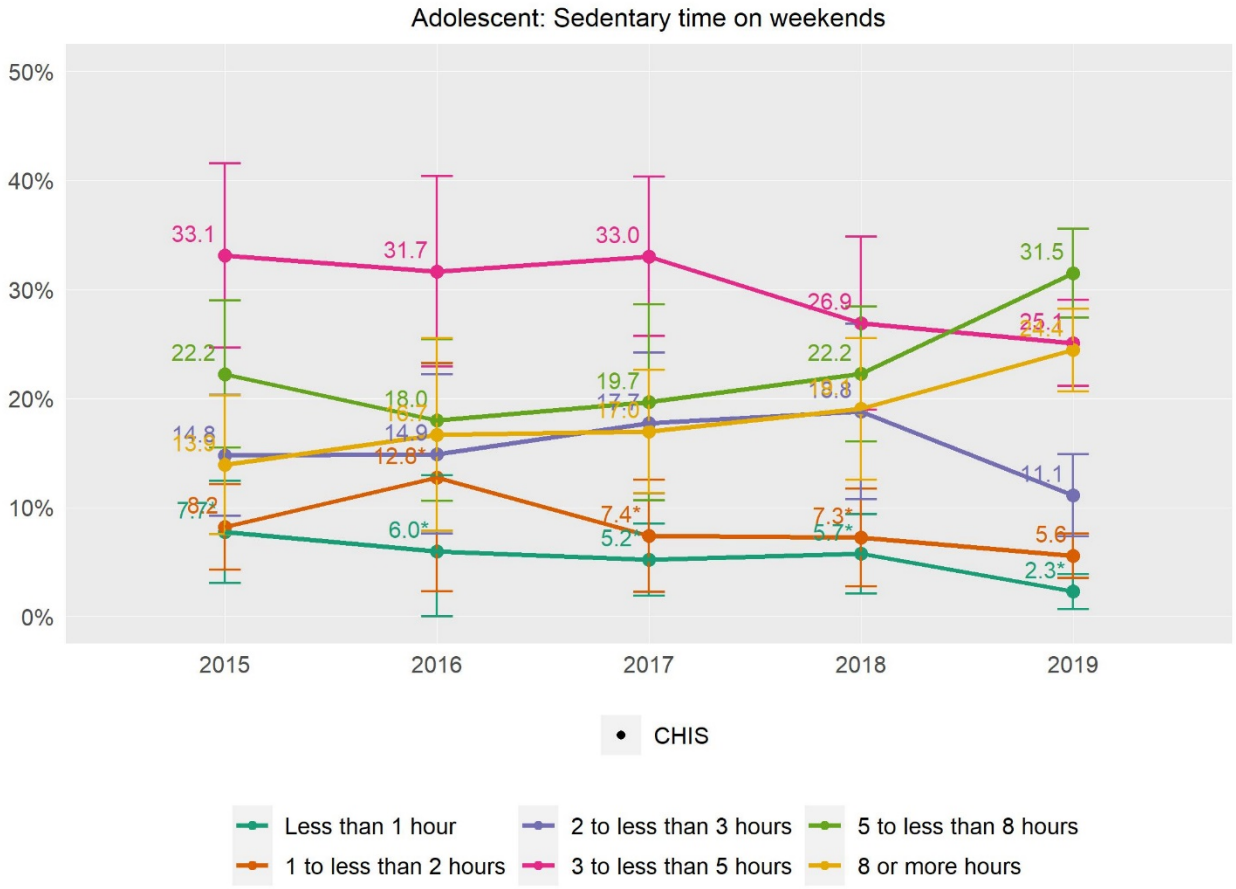
The percent of adolescent smokers continues to remain low with an estimated rate of 0.5% in 2019.




| Current smoker | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 |
|---|---|---|---|---|---|
| No | 99.0* | 97.4* | 99.2* | 99.8* | 99.5 |
| | (98.0, 100.0) | (94.3, 100.0) | (98.0, 100.0) | (99.4, 100.0) | (99.2, 99.8) |
| Yes | 1.0* | 2.6* | 0.8* | - | 0.5 |
| | (0.0, 2.0) | (0.0, 5.7) | (0.0, 2.0) | - | (1.9, 5.6) |

Note. * = statistically unstable. -- = suppressed due to small sample size.

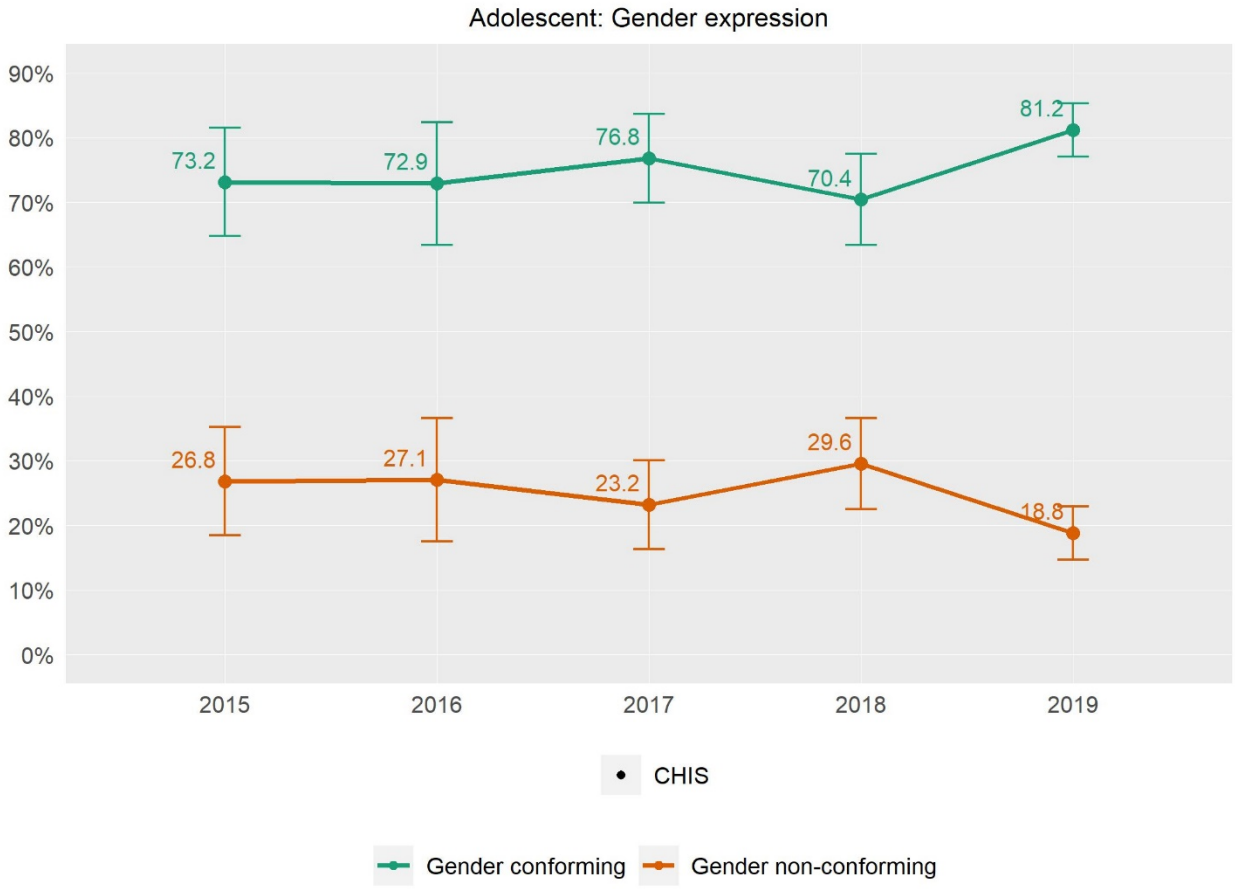
We do observe increases in sedentary time on weekends with the largest gains in the 5 to 8 hours (22.2% to 31.5%) and 8 or more hours (17.0% to 24.4%) groups. Large variances for each estimate do result in crossing confidence intervals when comparing 2018 to 2019.




| Sedentary time on weekends | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 |
|---|---|---|---|---|---|
| Less than 1 hour | 7.7* (3.1, 12.4) | 6.0* (0.0, 12.9) | 5.2* (1.9, 8.5) | 5.7* (2.1, 9.4) | 2.3* (0.7, 3.9) |
| 1 to less than 2 hours | 8.2 (4.3, 12.2) | 12.8* (2.3, 23.2) | 7.4* (2.3, 12.5) | 7.3* (2.8, 11.7) | 5.6 (3.5, 7.6) |
| 2 to less than 3 hours | 14.8 (9.2, 20.3) | 14.9 (7.6, 22.2) | 17.7 (11.3, 24.2) | 18.8 (10.8, 26.8) | 11.1 (7.4, 14.9) |
| 3 to less than 5 hours | 33.1 (24.7, 41.6) | 31.7 (22.9, 40.4) | 33.0 (25.7, 40.3) | 26.9 (18.9, 34.9) | 25.1 (21.2, 29.0) |
| 5 to less than 8 hours | 22.2 (15.5, 29.0) | 18 (10.6, 25.4) | 19.7 (10.7, 28.6) | 22.2 (16.0, 28.5) | 31.5 (27.4, 35.6) |
| 8 or more hours | 13.9 (7.5, 20.3) | 16.7 (7.8, 25.5) | 17.0 (11.3, 22.6) | 19.1 (12.6, 25.5) | 24.4 (20.6, 28.2) |

Note. * = statistically unstable.

Finally, we examine perceived adolescent gender expression. While there seems to be a drop in gender non-conforming adolescents, the confidence intervals for the 2019 estimates overlap with the previous years.




| Gender expression | CHIS 2015 | CHIS 2016 | CHIS 2017 | CHIS 2018 | CHIS 2019 |
|---|---|---|---|---|---|
| Gender conforming | 73.2 (64.8, 81.5) | 72.9 (63.4, 82.4) | 76.8 (69.9, 83.7) | 70.4 (63.4, 77.5) | 81.2 (77.1, 85.3) |
| Gender non-conforming | 26.8 (18.5, 35.2) | 27.1 (17.6, 36.6) | 23.2 (16.3, 30.1) | 29.6 (22.5, 36.6) | 18.8 (14.7, 22.9) |

**Discussion and Conclusions**

The implementation of a new sampling and data collection methodology for a repeated cross-sectional survey provides a challenge for many data users who want to trend over time. Despite smaller methodological changes since CHIS 2001, the move to address-based sampling and a mixed-mode survey in CHIS 2019-2020 represents a fundamental shift in how health data in California is collected. The new design shows tremendous promise for CHIS by reversing historically declining response rates, nearly doubling child and adolescent completes per year, and obtaining some improvements in demographic characteristics.

Despite these overall improvements, CHIS should continue to take innovative steps to improve representation of underrepresented groups including the less educated, low FPL households, respondents age 18-24, and limited English proficient speakers, especially those who speak Spanish, Vietnamese, and Tagalog. Improvements to CHIS 2021-2022 should attempt to address these particular limitations.

With regards to data trends and the redesign, we feel that a large majority of substantive survey items are consistent across the methodological changes. With some exceptions, the general recommendation of this report is that most trends can be maintained across the methodological shift. However, there are major variables where trends need to be **interpreted with caution** given the methodological changes. These include:

- Family type
- English proficiency
- Self-rated health
- Current smoker
- Health insurance
- Poverty status

In addition, variables where response options were originally unread that became explicit in the web survey mode should potentially be considered a break in series. These include:

- Birth control (male)
- Hypertension

While variables like gender identity, sexual orientation, and housing tenure also experienced response option changes, we do not feel that these mode-specific additions necessitate a break in series from previous cycles.

While the Fall web experiment was helpful in vetting the new design and identifying early weaknesses, the pilot study clearly experienced a number of distributional differences that, if uncorrected, would have resulted in disparate estimates for purposes of trending CHIS 2019 with previous cycles. The methodological changes applied in CHIS 2019-2020 should be maintained in future cycles along with the added improvements noted above.

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## Disclaimer

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