**Declines in pregnancies among US adolescents from 2007 to 2017: behavioral contributors to the trend**

**Online supplement**

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# Overview of project and modeling

This manuscript emerged within the context of an ongoing collaboration between CDC’s Division of Adolescent and School Health (DASH) and a group of academic researchers, itself part of a larger cooperative agreement under the umbrella of NEEMA (NCHHSTP Epidemiologic and Economic Modeling Agreement). This work began with the development of an Excel tool for health departments to predict intervention impacts for sexual health in their jurisdiction (teen-SPARC: <http://www.campmodeling.org/teensparc>), based on data in the Youth Risk Behavior Survey (YRBS). This led directly into a series of three papers that first used this tool for a single-year case study ([1](#_ENREF_1)), and then expanded the model out to cover 10 years, looking first at STIs ([2](#_ENREF_2)) and now pregnancies (this paper). All three papers employ variations on the same underlying mathematical model. Modeling is an approach that is generally familiar in its broad goals, methods and terminologies to many in the world of STIs and other communicable diseases, in cost-effectiveness research, and in formal demography, but is less commonly used in other branches of reproductive health. We thus provide a brief conceptual introduction here.

Mathematical modeling investigates a dynamic system by abstracting that system into a simplified representation—in some cases a set of equations, while in others a set of rules to be applied over and over, typically in a computer simulation. In either case, the idea is generally to establish the representation, then run the process forward in time to determine an outcome or range of outcomes. This process can be useful when the system itself is complicated enough that one cannot simply identify those outcomes more directly. Models can get quite complicated, especially when they involve multiple forms of interdependence such as in the transmission of an infection through a population; the one employed in this paper is on the simpler side. All of these models differ from most traditional statistical analyses, which are usually trying to identify some aspect of a process or the parameters that govern it from a set of outcomes; such analyses are thus conceptually investigating the process backwards in time rather than forwards.

The background of this paper as part of a set developed by DASH and partners guides a number of decisions about the details of the project, most notably the use of YRBS as the main data source. YRBS is a survey of US high school students, and covers the age range associated with these students, with a large sample size (roughly 6,750 per survey year). Given DASH’s mandate to focus on adolescent and school health, it is a natural choice for this series of papers, and has been kept constant throughout. It does introduce some challenges, however, particularly since it includes only adolescents enrolled in school; methods for dealing with this are discussed in each paper, and below. More generally, the series aims to keep the basic structure of the model, its parameterization, and the target population under consideration relatively preserved across all the studies for comparability, with obvious adjustments to represent key structural differences between STIs and pregnancies.

One of the great strengths of modeling is that it allows one to simulate alternative realities that answer a range of different questions. In this paper, a major example entails simulating worlds in which only one of the multiple forms of behavior change occurs, allowing us to partition out the effect of each one. As is common in modeling, we do so by comparing each of these alternative scenarios to a hypothetical, unobserved baseline scenario—one in which no behavior change happened at all. We can then say—how many adolescent pregnancies would there have been over the decade with no behavior change? With each form of behavior change in isolation? With all of them as observed? Comparing the alternative scenarios to the baseline provides an estimate of the pregnancies averted by the changes included in each alternative scenario.

Because modeling simulates a process forward over time, it is necessary to place all events relevant to that system at a specific time (or time step). In our model, we are using year-long time steps, i.e. identifying the number of pregnancies per year. We must then estimate, for example, how many sex acts adolescent females of each age are having on average in each year. As part of that, we also estimate how many partners they have on average. Often, data sources do not directly provide this kind of information in a strictly temporal form, and this project is no exception. For example, YRBS includes questions on the current age of the respondent, the age of first sex, and the lifetime number of partners. None of these pieces of information alone tells us how many partners respondents average per year at each age; however, we can collectively back-calculate a set of such estimates from these three pieces of information for a whole population. Details for how we do so are in the teen-SPARC manual (<http://www.campmodeling.org/teensparc>).

Models often need to *calibrate*—that is, to ensure that their output matches some known metric, typically before or at the start of the time period of interest. For example, we wish to make sure that our model matches the reported numbers of pregnancies and/or births in 2007 from the population structure and behaviors that were reported around that time. Once that is done, we can then introduce the behavior change moving forward, to see how the births change. Calibration typically requires setting one or more calibration targets, i.e. parameter(s) whose values are not well known and which are believed to be relatively fixed over the simulation interval. One also needs a calibration method that explores the parameter space until finding appropriate values for the calibration target(s). We use a version of the popular class of methods known as Approximate Bayesian Computation (ABC). Calibration targets can also represent a combined set of unknown parameters—e.g. two quantities multiple together—where one only identifies the product of the two values and not the individual values. This approach allows one to control for some forms of incomplete data and bias. In the current paper, the example of this is the ratio of pregnancy exposure in the adolescent population as a whole compare to that in school. This is because the behavioral data for the model is from YRBS (i.e. among students aged 14-18) but the birth data to which we are calibrating is among all females aged 14-18. Since students out of school likely have more exposure to pregnancy risk, this ratio is surely above 1. Without knowing what the ratio is, by assuming that it is implicitly a component of the calibration target, we avoid assuming that students out of school and students in school have similar behaviors. Since we keep the calibration target fixed over the simulation, however, we are assuming that the relative amount of change in each group over the decade is proportional.

Modeling also allows one to explore cases in which data about the process are unavailable, but outcomes are known, such that one can identify the values for the process that would be consistent with the outcomes. Here we do this in the case of the number of sex acts per partner. Since we do not have information on how this changes over time (only for 2007), we can postulate rates of decline in this and determine how much change would be needed to yield the overall numbers of birth in the decade that we see. This allows one to extract more useful information out of what is already known than other methods may. These kinds of uses of models also help to refine our hypotheses not only about the process itself, but also about what information would be useful to collect in the future, and in what forms.

# Clarification of the definition of partners per year

In considering our metrics of age at first sexual intercourse and number of partners per year, it is important to understand that the latter includes in the denominator only those years from first sexual intercourse onwards, not those before. This separates the two measures out more clearly, since a delay in age at first sex does not automatically also reduce the partners per year. To provide an explicit example, the calculations would be as follows:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Partners in Year 1 | Partners in Year 2 | Partners in Year 3 | Year of 1st sexual intercourse | Mean # of partners/ year |
| Respondent 1 | 2 | 2 | 2 | Year 1 | 2.0 |
| Respondent 2 | 0 | 2 | 2 | Year 2 | 2.0 |
| Respondent 3 | 1 | 1 | 1 | Year 1 | 1.0 |

That is, respondent 2 has an average of 2 partners per year (4 partners / 2 years since first sex) instead of 1.33 (4 partners / 3 years).

# Details concerning the treatment of demographic attributes

*Race/ethnicity.* As our previous work modeling gonorrhea and chlamydia with these data (in press) explored differences in behavior and STI burden by race/ethnicity, each of the regressions included a race variable in them. These regressions were used solely for the purpose of obtaining predicted values for various quantities to go into the model, such as the proportion of adolescents who have ever had sexual intercourse. The analysis in this current paper does not focus on race/ethnicity. Nevertheless, we chose not to redo all of the data and statistical analyses, but instead began with our existing output and then aggregated outcomes across race/ethnicity groups. For quantities representing total numbers we calculated sums, while for quantities representing proportions or probabilities, we calculated weighted means.

*Age*. We included 13-year-olds throughout the process of developing and parameterizing the model. However, their low rates of sexual activity and small sample size in the Youth Risk Behavior Survey (YRBS) meant that some of their behavioral estimates showed enormous variation from year to year. This is especially true for their use of types of contraception. For this reason, we ultimately excluded them from our final modeling analyses.

# Table S1: Parameter inputs used for simulations

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol**  | **Parameter** | **Female value(s)** | **Sources**  |
| $$E\_{a,y}$$ | Population size  | Varies by age and year  | US Census Bureau, annual estimates of population by sex and single-year age groups (table PEPALL6N for 2010 onwards, through data request for prior years) |
| $$D\_{a,y}$$ | Proportion of high school students who report having ever had sex | Varies by age and year; see online supplement of ([3](#_ENREF_3)) for more information and numerical estimates  | Specific values for each age-sex-year combination, derived through regressions from Youth Risk Behavior Survey (YRBS) data  |
| $$c\_{a,y}$$ | Number of acts of sexual intercourse (SI)/year |
|  | - partners per year | Varies by age and year; see online supplement of ([3](#_ENREF_3)) for more information and numerical estimates | Specific values for each age-year combination, derived through regressions from YRBS data as described in text |
|  | - mean acts of SI per partner  | 13a-15-year-olds: 9.416-17-year-olds: 24.718-year-olds: 46.7 | Drawn from the values used in the *teen-SPARC* online tool following methods described in the manual ([www.emorycamp.org/teensparc](http://www.emorycamp.org/teensparc)), deriving ultimately from an analysis of the National Survey of Family Growth (NSFG). Note that YRBS does not include data on coital frequency. |
| $$φ\_{a,y,m}$$ | Probability of contraception use by method, by age and year | Varies by age, year and method | Specific values for each age-year-method combination, derived through regressions from YRBS data as described in text |
| $$f$$ | Probability of detectable pregnancy per act of intercourse with no form of contraception | 1.28% | Derived through model calibration from behavioral outputs and estimated pregnancies in 2007, as described in text |
| $$r\_{m}$$ | Probability of contraception failure by method, relative to no method (100%) | See Table S2 | Derived through model calibration from behavioral outputs and estimated pregnancies in 2007, as described in text |

Abbreviations: YRBS = Youth Risk Behavior Survey. SI = sexual intercourse. Subscripts: *a* = age, *y* = year.

a We included 13-year-olds throughout the process of developing and parameterizing the model. However, their very small size and low rates of sexual activity meant that some of their behavioral estimates showed wide variation from year to year. For this reason, we ultimately excluded them from our final modeling analyses.

# Table S2. Modeled Relative Failure Rates of Contraception Methods

|  |  |  |  |
| --- | --- | --- | --- |
| Method | (a) Risk of conception per annum  | (b) Failure rate relative to no method (=a/0.85) | Derivation relative to source document ([4](#_ENREF_4)) |
| No method | 85% | 100.0% | Estimate taken directly from the source document |
| Pills | 7% | 8.2% | Source document estimated both combined oral contraceptives and progestin-only oral contraceptives at 7% |
| Condoms | 13% | 15.3% | Based on estimate for male condoms (13%) under the assumption that use of female condoms (whose estimate for contraception per annum is 21%) is uncommon. |
| Long-acting reversible contraceptives (LARCs) | 0.2% | 0.24% | Combines levonorgestrel IUD (0.1-0.4%), Copper T IUD (0.8%), and implant (0.1%) using estimates of the distribution of each from the Contraceptive CHOICE Study ([5](#_ENREF_5), [6](#_ENREF_6)) to weight. |
| Other hormonal | 4% | 4.7% | Source document estimated injectable contraception at 4% and patch and ring both 7%. We used 4%, given one source suggesting that injection is more commonly used for adolescent females ([7](#_ENREF_7))  |
| Withdrawal or other | 20% | 23.5% | We used source document estimate for withdrawal (20%). See text for explanation of why this likely comprises the vast majority of those selecting “withdrawal or other”  |

All values were based on “typical use failure rates” reported in cit. ([4](#_ENREF_4)), as initially accessed from cit. ([8](#_ENREF_8)). Typical use failure rate was defined as the % of women experiencing an unintended pregnancy during the first year of typical use (Column a). We then calculated probabilities relative to no method (Column b), for inclusion into our model formula as factors by which to multiply conception probabilities relative to no method.

# Estimation of calibration target numbers: pregnancies by single year of maternal age in 2007

To obtain these estimates, we use two data sources: live births per one-year maternal age group for 2007 from the National Vital Statistics System, or NVSS ([Table S3 column A, 9](#_ENREF_9)) and estimated pregnancies for 2007 in binned age groups as produced by The Guttmacher Institute ([column B, 10](#_ENREF_10)). We then made the assumption that the live-births-to-pregnancy ratio (LBPR) increased monotonically across individual ages for adolescent females 13-19, as was the case across the three age bins. We considered two functions for this ratio: a linear increase and a logistic increase by age. We used Approximate Bayesian Computation to determine the parameters for each function that yielded pregnancies by single year of maternal age that, when binned, minimized the summed absolute differences to the reported binned pregnancies from Guttmacher. The linear model was unable to find a solution within our threshold, while the logistic model converged (column C). Applying these ratios to the number of live births by age in 2007 from the NVSS yielded estimates for pregnancies (column D) which when re-binned (column E) indeed approximate the source numbers (column B).

# Table S3: Derivation of estimates of 2007 pregnancies by single year of maternal age

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Age | A. 2007 births (NVSS) ([9](#_ENREF_9)) | B. 2007 pregnancies ([10](#_ENREF_10))a | C. Est. live-birth-to-preg. ratio  | D. Est. 2007 pregnancies (A/C)b | E. Est. 2007 pregnancies (binned) |
| 13 | 925 | } 14,520 { | 0.3261 | **2,836**c | } 14,547 |
| 14 | 5,120 | 0.4372 | **11,710** |
| 15 | 18,449 | } 247,000 { | 0.5168 | **35,700** | } 246,907 |
| 16 | 43,267 | 0.5631 | **76,841** |
| 17 | 78,850 | 0.5868 | **134,366** |
| 18 | 127,034 | } 506,100 { | 0.5982 | **212,348** | } 506,115 |
| 19 | 177,299 | 0.6035 | 293,767 |
| Abbreviations: est. = estimated. preg. = pregnancy. NVSS = National Vital Statistics Systema The source document provides an estimate for pregnancies for females aged 14 and younger, which we use here; by assigning these to age 13, we are assuming that pregnancies for females aged 12 and under are a minute proportion of this total |
| b Calculated on the pre-rounded ratios, so do not exactly equal A/C as displayed |
| **c Bold numbers** are the final outcomes used as targets for the subsequent model calibration |

# Table S4: Descriptive statistics of sample by year

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |   | 2007 | 2009 | 2011 | 2013 | 2015 | 2017 |
| N | 14,041 | 16,410 | 15,425 | 13,583 | 15,624 | 14,765 |
| weighted percent missing key data | 0.6% | 0.5% | 0.5% | 0.5% | 0.9% | 0.8% |
| weighted % age 14+ |   | 99.8% | 99.8% | 99.7% | 99.7% | 99.7% | 99.6% |
| weighted % female a | 49.5% | 47.8% | 48.5% | 50.1% | 48.7% | 50.8% |
| N of female 14+ sub-sample |   | 6,895 | 7,781 | 7,417 | 6,741 | 7,531 | 7,404 |
| weighted % of sub-sample: |  |  |  |  |  |  |  |
|  Age | 14 | 12.1% | 12.0% | 12.7% | 10.5% | 11.2% | 12.6% |
|  | 15 | 26.1% | 24.8% | 24.8% | 25.3% | 25.6% | 25.0% |
|  | 16 | 25.5% | 25.4% | 26.1% | 25.1% | 26.0% | 25.9% |
|  | 17 | 23.5% | 25.2% | 24.1% | 24.7% | 23.9% | 24.0% |
|  | 18 b | 12.8% | 12.7% | 12.2% | 14.5% | 13.3% | 12.5% |
|  |  |  |  |  |  |  |  |
|  race/ethnicity | NH Black | 15.0% | 14.9% | 14.4% | 14.6% | 13.1% | 13.3% |
|  | Hispanic | 16.7% | 19.1% | 19.9% | 21.3% | 22.3% | 21.8% |
|  | NH White | 60.5% | 57.0% | 56.7% | 55.1% | 55.6% | 54.4% |
|  | NH Other | 7.7% | 8.9% | 9.0% | 9.0% | 9.1% | 10.5% |
|  |  |  |  |  |  |  |  |
| ever had sexual intercourse (SI) |  | 45.8% | 45.7% | 45.6% | 46.0% | 39.2% | 37.7% |
|  |  |  |  |  |  |  |  |
| mean lifetime SI partners  |  | 2.6 | 2.5 | 2.6 | 2.6 | 2.4 | 2.3 |
|  (among those who have ever had SI)c |  |  |  |  |  |  |
| birth control use at last sex  |   |   |   | See Figure 1 |   |   |
| NH = non-Hispanic; SI = sexual intercourse |
| Note: numbers do not all exactly match corresponding results for females in annual YRBS reports since we exclude respondents below age 14 and those with missing data on key variablesa among those ages 14-18 |
| b YRBS reports the highest age category as 18+, so the sample likely includes a small proportion of students who are above 18 |
| c The small number of students (4.7%) who reported "6 or more" are top-coded as 6 |
|  |

# Estimation of mean costs per adolescent pregnancy by year

Pregnancy-related cost estimates were obtained through four steps. First, we used IBM® MarketScan® 2007-2017 Commercial and Medicaid Databases to estimate average medical costs of delivery and abortion (including miscarriage) among 13-19-year-old females, with costs for Medicaid enrollees and commercial insurance enrollees estimated separately. We also estimated mean prenatal care costs among those who had a delivery or for those who had an abortion. We then added prenatal costs to the mean cost of delivery and abortion to estimate the “all-inclusive cost” for females who had a delivery or an abortion. Second, we used the distribution of U.S. children under age 18 years by types of health insurance ([11](#_ENREF_11)) and the “all-inclusive cost” for females having commercial or Medicaid insurance coverage to calculate the weighted “all-inclusive cost” per female who had a delivery or an abortion. Third, based on the number of teen pregnancies, births, abortions, and fetal losses reported by Guttmacher Institute ([10](#_ENREF_10)), we estimated the percentage of pregnancies ending in abortion, miscarriage, live birth, and still birth, assuming only 1% of deliveries resulting in stillbirth. (Because the Guttmacher report does not have data for 2017, we used the percentages of 2016 for 2017). Using those percentages and the “all-inclusive cost” per female who had a delivery or an abortion, we calculated the weighted average medical cost per pregnant female in each year between 2007-2017. We applied the “all-inclusive” delivery costs to cases of live birth and stillbirth and the “all-inclusive” abortion costs to cases of abortion and miscarriage. Fourth, Hoffman et al. ([12](#_ENREF_12)) estimated that the added costs to society of teenage childbearing (relative to delaying childbearing until age 20-21) are $15,186, including earnings-related outcomes, public assistance, out-of-pocket cost, foster care of minor children, and incarceration of adolescent/adult children. We calculated the total cost per pregnant female as the sum of medical cost and social cost. All costs were adjusted to 2017 dollars by using the All Items Consumer Price Index ([CPI, 13](#_ENREF_13)) for social costs and by using the Medical Care component of the CPI for medical costs ([14](#_ENREF_14)). Medical costs in years prior to 2017 were compounded to 2017 values using a 3% interest rate. The resulting costs are shown in Table S5.

# Table S5: Mean estimated costs per adolescent pregnancy, in 2017 US dollars

|  |  |
| --- | --- |
| Year | Mean cost |
| 2008 | $20,308 |
| 2009 | $21,057 |
| 2010 | $20,090 |
| 2011 | $19,325 |
| 2012 | $19,160 |
| 2013 | $21,247 |
| 2014 | $19,670 |
| 2015 | $19,255 |
| 2016 | $19,080 |
| 2017 | $19,013 |
| 2018 | $20,308 |

# Table S6: Numerical model results: med-LARC scenario

**6a. Med-LARC scenario – pregnancies averted by year**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Overall |  | By delays in age at first sexual intercourse |  | By reductions in partner # |  | By changes in contraception use |
|  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |
| 2008 | 13,585 | 16,260 | 18,935 |  | 8,401 | 8,827 | 9,253 |  | -283 | 1,478 | 3,239 |  | 4,087 | 5,955 | 7,823 |
| 2009 | 27,568 | 32,791 | 38,014 |  | 16,887 | 17,750 | 18,613 |  | -597 | 2,941 | 6,479 |  | 8,351 | 12,100 | 15,849 |
| 2010 | 36,240 | 42,521 | 48,802 |  | 25,445 | 26,754 | 28,063 |  | -950 | 4,385 | 9,720 |  | 8,055 | 11,382 | 14,709 |
| 2011 | 44,598 | 52,496 | 60,394 |  | 34,062 | 35,824 | 37,586 |  | -1,344 | 5,811 | 12,966 |  | 7,120 | 10,861 | 14,602 |
| 2012 | 43,797 | 52,912 | 62,027 |  | 42,725 | 44,946 | 47,167 |  | -1,783 | 7,221 | 16,225 |  | -2,381 | 745 | 3,871 |
| 2013 | 42,820 | 53,486 | 64,152 |  | 51,416 | 54,100 | 56,784 |  | -2,273 | 8,614 | 19,501 |  | -12,566 | -9,228 | -5,890 |
| 2014 | 54,031 | 66,028 | 78,025 |  | 60,121 | 63,269 | 66,417 |  | -2,816 | 9,991 | 22,798 |  | -10,633 | -7,232 | -3,831 |
| 2015 | 65,271 | 78,780 | 92,289 |  | 68,828 | 72,438 | 76,048 |  | -3,419 | 11,350 | 26,119 |  | -9,607 | -5,008 | -409 |
| 2016 | 85,322 | 99,518 | 113,714 |  | 77,514 | 81,584 | 85,654 |  | -4,084 | 12,694 | 29,472 |  | 1,641 | 5,240 | 8,839 |
| 2017 | 105,581 | 120,596 | 135,611 |  | 86,169 | 90,692 | 95,215 |  | -4,817 | 14,021 | 32,859 |  | 12,409 | 15,883 | 19,357 |
| **Total** | **518,813** | **615,388** | **711,963** |  | **471,568** | **496,184** | **520,800** |  | **-22,366** | **78,506** | **179,378** |  | **6,476** | **40,698** | **74,920** |

**6b. Med-LARC scenario – costs averted by year (in US $ millions)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Overall |  | By delays in age at first sexual intercourse |  | By reductions in partner # |  | By changes in contraception use |
|  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |
| 2008 | 275.9 | 330.2 | 384.5 |  | 170.6 | 179.3 | 187.9 |  | -5.8 | 30.0 | 65.8 |  | 83.0 | 120.9 | 158.9 |
| 2009 | 580.5 | 690.5 | 800.5 |  | 355.6 | 373.8 | 391.9 |  | -12.6 | 61.9 | 136.4 |  | 175.8 | 254.8 | 333.7 |
| 2010 | 728.1 | 854.2 | 980.4 |  | 511.2 | 537.5 | 563.8 |  | -19.1 | 88.1 | 195.3 |  | 161.8 | 228.7 | 295.5 |
| 2011 | 861.8 | 1,014.5 | 1,167.1 |  | 658.2 | 692.3 | 726.4 |  | -26.0 | 112.3 | 250.6 |  | 137.6 | 209.9 | 282.2 |
| 2012 | 839.1 | 1,013.8 | 1,188.4 |  | 818.6 | 861.2 | 903.7 |  | -34.2 | 138.4 | 310.9 |  | -45.6 | 14.3 | 74.2 |
| 2013 | 909.8 | 1,136.4 | 1,363.0 |  | 1,092.4 | 1,149.5 | 1,206.5 |  | -48.3 | 183.0 | 414.3 |  | -267.0 | -196.1 | -125.1 |
| 2014 | 1,062.8 | 1,298.8 | 1,534.7 |  | 1,182.6 | 1,244.5 | 1,306.4 |  | -55.4 | 196.5 | 448.4 |  | -209.1 | -142.3 | -75.4 |
| 2015 | 1,256.8 | 1,516.9 | 1,777.0 |  | 1,325.3 | 1,394.8 | 1,464.3 |  | -65.8 | 218.5 | 502.9 |  | -185.0 | -96.4 | -7.9 |
| 2016 | 1,627.9 | 1,898.8 | 2,169.7 |  | 1,479.0 | 1,556.6 | 1,634.3 |  | -77.9 | 242.2 | 562.3 |  | 31.3 | 100.0 | 168.7 |
| 2017 | 2,007.4 | 2,292.9 | 2,578.4 |   | 1,638.3 | 1,724.3 | 1,810.3 |   | -91.6 | 266.6 | 624.7 |   | 235.9 | 302.0 | 368.0 |
| **Total** | **10,150.1** | **12,047.0** | **13,943.7** |  | **9,231.8** | **9,713.8** | **10,195.5** |  | **-436.7** | **1,537.5** | **3,511.6** |  | **118.7** | **795.8** | **1,472.8** |

**6c. Med-LARC scenario – pregnancies averted by age**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Overall |  | By delays in age at first sexual intercourse |  | By reductions in partner # |  | By changes in contraception use |
|  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |
| 14 | -16,463 | -12,251 | -8,039 |  | 20,839 | 21,923 | 23,007 |  | -526 | 2,104 | 4,734 |  | -40,402 | -36,278 | -32,154 |
| 15 | 8,669 | 16,874 | 25,079 |  | 54,325 | 57,201 | 60,077 |  | -1,697 | 6,238 | 14,173 |  | -50,816 | -46,565 | -42,314 |
| 16 | 77,778 | 94,644 | 111,510 |  | 92,827 | 97,840 | 102,853 |  | -3,486 | 13,407 | 30,300 |  | -24,568 | -16,603 | -8,638 |
| 17 | 99,698 | 129,879 | 160,060 |  | 130,440 | 137,152 | 143,864 |  | -6,736 | 22,311 | 51,358 |  | -42,205 | -29,584 | -16,963 |
| 18 | 344,126 | 386,242 | 428,358 |   | 172,935 | 182,068 | 191,201 |   | -9,867 | 34,446 | 78,759 |   | 149,861 | 169,728 | 189,595 |
| **Total** | **513,808** | **615,388** | **716,968** |  | **471,366** | **496,184** | **521,002** |  | **-22,312** | **78,506** | **179,324** |  | **-8,130** | **40,698** | **89,526** |

**6d. Med-LARC scenario – costs averted by age (in US $ millions)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Overall |  | By delays in age at first sexual intercourse |  | By reductions in partner # |  | By changes in contraception use |
|  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |
| 14 | -324.9 | -241.9 | -158.9 |  | 408.4 | 429.6 | 450.9 |  | -10.3 | 41.2 | 92.7 |  | -794.3 | -712.7 | -631.2 |
| 15 | 173.2 | 334.2 | 495.2 |  | 1,064.2 | 1,120.6 | 1,176.9 |  | -33.1 | 122.2 | 277.5 |  | -992.7 | -908.6 | -824.5 |
| 16 | 1,499.5 | 1,831.5 | 2,163.5 |  | 1,817.6 | 1,915.8 | 2,014.0 |  | -68.0 | 262.6 | 593.2 |  | -504.3 | -346.9 | -189.4 |
| 17 | 1,958.1 | 2,550.7 | 3,143.3 |  | 2,553.3 | 2,684.6 | 2,816.0 |  | -131.5 | 437.0 | 1,005.4 |  | -820.6 | -570.9 | -321.2 |
| 18 | 6,744.7 | 7,572.5 | 8,400.4 |   | 3,384.4 | 3,563.0 | 3,741.7 |   | -192.6 | 674.6 | 1,541.9 |   | 2,941.2 | 3,334.9 | 3,728.6 |
| **Total** | **10,050.6** | **12,047.0** | **14,043.5** |  | **9,227.9** | **9,713.6** | **10,199.5** |  | **-435.5** | **1,537.6** | **3,510.7** |  | **-170.7** | **795.8** | **1,762.3** |

# Table S7: Numerical model results: min-LARC scenario

**7a. Min-LARC scenario – pregnancies averted by year**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Overall |  | By delays in age at first sexual intercourse |  | By reductions in partner # |  | By changes in contraception use |
|  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |
| 2008 | 13,310 | 15,987 | 18,664 |  | 8,399 | 8,825 | 9,251 |  | -283 | 1,478 | 3,239 |  | 3,815 | 5,684 | 7,553 |
| 2009 | 27,018 | 32,246 | 37,474 |  | 16,885 | 17,748 | 18,611 |  | -599 | 2,939 | 6,477 |  | 7,807 | 11,559 | 15,311 |
| 2010 | 35,411 | 41,703 | 47,995 |  | 25,441 | 26,750 | 28,059 |  | -952 | 4,383 | 9,718 |  | 7,238 | 10,570 | 13,902 |
| 2011 | 43,488 | 51,404 | 59,320 |  | 34,058 | 35,820 | 37,582 |  | -1,345 | 5,810 | 12,965 |  | 6,027 | 9,774 | 13,521 |
| 2012 | 43,242 | 52,368 | 61,494 |  | 42,720 | 44,941 | 47,162 |  | -1,784 | 7,220 | 16,224 |  | -2,921 | 207 | 3,335 |
| 2013 | 42,817 | 53,483 | 64,149 |  | 51,412 | 54,095 | 56,778 |  | -2,275 | 8,612 | 19,499 |  | -12,562 | -9,224 | -5,886 |
| 2014 | 54,029 | 66,025 | 78,021 |  | 60,118 | 63,265 | 66,412 |  | -2,818 | 9,989 | 22,796 |  | -10,630 | -7,229 | -3,828 |
| 2015 | 65,268 | 78,777 | 92,286 |  | 68,823 | 72,433 | 76,043 |  | -3,419 | 11,350 | 26,119 |  | -9,605 | -5,006 | -407 |
| 2016 | 85,320 | 99,516 | 113,712 |  | 77,509 | 81,578 | 85,647 |  | -4,085 | 12,693 | 29,471 |  | 1,646 | 5,245 | 8,844 |
| 2017 | 105,581 | 120,596 | 135,611 |   | 86,163 | 90,685 | 95,207 |   | -4,819 | 14,019 | 32,857 |   | 12,418 | 15,892 | 19,366 |
| **Total** | **515,484** | **612,105** | **708,726** |  | **471,528** | **496,140** | **520,752** |  | **-22,379** | **78,493** | **179,365** |  | **3,233** | **37,472** | **71,711** |

**7b. Min-LARC scenario – costs averted by year (in US $ millions)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Overall |  | By delays in age at first sexual intercourse |  | By reductions in partner # |  | By changes in contraception use |
|  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |
| 2008 | 270.3 | 324.7 | 379.0 |  | 170.6 | 179.2 | 187.9 |  | -5.8 | 30.0 | 65.8 |  | 77.5 | 115.4 | 153.4 |
| 2009 | 568.9 | 679.0 | 789.1 |  | 355.6 | 373.7 | 391.9 |  | -12.6 | 61.9 | 136.4 |  | 164.4 | 243.4 | 322.4 |
| 2010 | 711.4 | 837.8 | 964.2 |  | 511.1 | 537.4 | 563.7 |  | -19.1 | 88.1 | 195.2 |  | 145.4 | 212.4 | 279.3 |
| 2011 | 840.4 | 993.4 | 1,146.4 |  | 658.2 | 692.2 | 726.3 |  | -26.0 | 112.3 | 250.5 |  | 116.5 | 188.9 | 261.3 |
| 2012 | 828.5 | 1,003.4 | 1,178.2 |  | 818.5 | 861.1 | 903.6 |  | -34.2 | 138.3 | 310.9 |  | -56.0 | 4.0 | 63.9 |
| 2013 | 909.7 | 1,136.4 | 1,363.0 |  | 1,092.3 | 1,149.4 | 1,206.4 |  | -48.3 | 183.0 | 414.3 |  | -266.9 | -196.0 | -125.1 |
| 2014 | 1,062.7 | 1,298.7 | 1,534.7 |  | 1,182.5 | 1,244.4 | 1,306.3 |  | -55.4 | 196.5 | 448.4 |  | -209.1 | -142.2 | -75.3 |
| 2015 | 1,256.7 | 1,516.9 | 1,777.0 |  | 1,325.2 | 1,394.7 | 1,464.2 |  | -65.8 | 218.5 | 502.9 |  | -184.9 | -96.4 | -7.8 |
| 2016 | 1,627.9 | 1,898.8 | 2,169.6 |  | 1,478.9 | 1,556.5 | 1,634.1 |  | -77.9 | 242.2 | 562.3 |  | 31.4 | 100.1 | 168.7 |
| 2017 | 2,007.4 | 2,292.9 | 2,578.4 |   | 1,638.2 | 1,724.2 | 1,810.2 |   | -91.6 | 266.5 | 624.7 |   | 236.1 | 302.2 | 368.2 |
| **Total** | **10,083.9** | **11,982.0** | **13,879.6** |  | **9,231.1** | **9,712.8** | **10,194.6** |  | **-436.7** | **1,537.3** | **3,511.4** |  | **54.4** | **731.8** | **1,409.0** |

**7c. Min-LARC scenario – pregnancies averted by age**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Overall |  | By delays in age at first sexual intercourse |  | By reductions in partner # |  | By changes in contraception use |
|  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |
| 14 | -16,472 | -12,259 | -8,046 |  | 20,816 | 21,900 | 22,984 |  | -526 | 2,105 | 4,736 |  | -40,387 | -36,264 | -32,141 |
| 15 | 8,538 | 16,743 | 24,948 |  | 54,315 | 57,187 | 60,059 |  | -1,702 | 6,233 | 14,168 |  | -50,927 | -46,677 | -42,427 |
| 16 | 77,366 | 94,238 | 111,110 |  | 92,828 | 97,840 | 102,852 |  | -3,488 | 13,405 | 30,298 |  | -24,979 | -17,007 | -9,035 |
| 17 | 98,991 | 129,185 | 159,379 |  | 130,441 | 137,153 | 143,865 |  | -6,740 | 22,307 | 51,354 |  | -42,907 | -30,275 | -17,643 |
| 18 | 342,050 | 384,198 | 426,346 |   | 172,929 | 182,060 | 191,191 |   | -9,869 | 34,443 | 78,755 |   | 147,810 | 167,695 | 187,580 |
| **Total** | **510,473** | **612,105** | **713,737** |  | **471,329** | **496,140** | **520,951** |  | **-22,325** | **78,493** | **179,311** |  | **-11,390** | **37,472** | **86,334** |

**7d. Min-LARC scenario – costs averted by age (in US $ millions)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Overall |  | By delays in age at first sexual intercourse |  | By reductions in partner # |  | By changes in contraception use |
|  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |
| 14 | -325.1 | -242.1 | -159.0 |  | 407.9 | 429.2 | 450.5 |  | -10.2 | 41.2 | 92.7 |  | -794.0 | -712.5 | -631.0 |
| 15 | 170.6 | 331.6 | 492.6 |  | 1,064.0 | 1,120.3 | 1,176.6 |  | -33.2 | 122.1 | 277.4 |  | -994.9 | -910.8 | -826.7 |
| 16 | 1,491.3 | 1,823.5 | 2,155.6 |  | 1,817.7 | 1,915.8 | 2,014.0 |  | -68.0 | 262.5 | 593.1 |  | -512.5 | -354.9 | -197.3 |
| 17 | 1,944.0 | 2,536.9 | 3,129.7 |  | 2,553.3 | 2,684.6 | 2,816.0 |  | -131.6 | 436.9 | 1,005.3 |  | -834.6 | -584.6 | -334.7 |
| 18 | 6,703.5 | 7,531.9 | 8,360.4 |   | 3,384.2 | 3,562.9 | 3,741.5 |   | -192.7 | 674.6 | 1,541.8 |   | 2,900.5 | 3,294.5 | 3,688.5 |
| **Total** | **9,984.3** | **11,981.8** | **13,979.3** |  | **9,227.1** | **9,712.8** | **10,198.6** |  | **-435.7** | **1,537.3** | **3,510.3** |  | **-235.5** | **731.7** | **1,698.8** |

# Table S8: Numerical model results: max-LARC scenario

**8a. Max-LARC scenario – pregnancies averted by year**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Overall |  | By delays in age at first sexual intercourse |  | By reductions in partner # |  | By changes in contraception use |
|  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |
| 2008 | 14,134 | 16,805 | 19,476 |  | 8,400 | 8,826 | 9,252 |  | -282 | 1,479 | 3,240 |  | 4,635 | 6,500 | 8,365 |
| 2009 | 28,672 | 33,884 | 39,096 |  | 16,885 | 17,748 | 18,611 |  | -599 | 2,939 | 6,477 |  | 9,453 | 13,197 | 16,941 |
| 2010 | 37,078 | 43,348 | 49,618 |  | 25,440 | 26,749 | 28,058 |  | -950 | 4,384 | 9,718 |  | 8,893 | 12,215 | 15,537 |
| 2011 | 45,165 | 53,055 | 60,945 |  | 34,057 | 35,819 | 37,581 |  | -1,344 | 5,811 | 12,966 |  | 7,687 | 11,425 | 15,163 |
| 2012 | 44,080 | 53,191 | 62,302 |  | 42,717 | 44,938 | 47,159 |  | -1,784 | 7,220 | 16,224 |  | -2,092 | 1,033 | 4,158 |
| 2013 | 42,827 | 53,493 | 64,159 |  | 51,409 | 54,092 | 56,775 |  | -2,273 | 8,614 | 19,501 |  | -12,551 | -9,213 | -5,875 |
| 2014 | 54,035 | 66,031 | 78,027 |  | 60,114 | 63,261 | 66,408 |  | -2,817 | 9,990 | 22,797 |  | -10,621 | -7,220 | -3,819 |
| 2015 | 65,270 | 78,779 | 92,288 |  | 68,819 | 72,429 | 76,039 |  | -3,420 | 11,349 | 26,118 |  | -9,598 | -4,999 | -400 |
| 2016 | 85,330 | 99,526 | 113,722 |  | 77,504 | 81,573 | 85,642 |  | -4,085 | 12,693 | 29,471 |  | 1,661 | 5,260 | 8,859 |
| 2017 | 105,599 | 120,614 | 135,629 |  | 86,159 | 90,681 | 95,203 |  | -4,818 | 14,020 | 32,858 |  | 12,439 | 15,913 | 19,387 |
| **Total** | **522,190** | **618,726** | **715,262** |  | **471,504** | **496,116** | **520,728** |  | **-22,372** | **78,499** | **179,370** |  | **9,906** | **44,111** | **78,316** |

**8b. Max-LARC scenario – costs averted by year (in US $ millions)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Overall |  | By delays in age at first sexual intercourse |  | By reductions in partner # |  | By changes in contraception use |
|  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |
| 2008 | 287.0 | 341.3 | 395.5 |  | 170.6 | 179.2 | 187.9 |  | -5.7 | 30.0 | 65.8 |  | 94.1 | 132.0 | 169.9 |
| 2009 | 603.7 | 713.5 | 823.3 |  | 355.6 | 373.7 | 391.9 |  | -12.6 | 61.9 | 136.4 |  | 199.0 | 277.9 | 356.7 |
| 2010 | 744.9 | 870.9 | 996.8 |  | 511.1 | 537.4 | 563.7 |  | -19.1 | 88.1 | 195.2 |  | 178.7 | 245.4 | 312.1 |
| 2011 | 872.8 | 1,025.3 | 1,177.8 |  | 658.2 | 692.2 | 726.3 |  | -26.0 | 112.3 | 250.6 |  | 148.6 | 220.8 | 293.0 |
| 2012 | 844.6 | 1,019.1 | 1,193.7 |  | 818.5 | 861.0 | 903.6 |  | -34.2 | 138.3 | 310.9 |  | -40.1 | 19.8 | 79.7 |
| 2013 | 909.9 | 1,136.6 | 1,363.2 |  | 1,092.3 | 1,149.3 | 1,206.3 |  | -48.3 | 183.0 | 414.3 |  | -266.7 | -195.7 | -124.8 |
| 2014 | 1,062.9 | 1,298.8 | 1,534.8 |  | 1,182.4 | 1,244.3 | 1,306.2 |  | -55.4 | 196.5 | 448.4 |  | -208.9 | -142.0 | -75.1 |
| 2015 | 1,256.8 | 1,516.9 | 1,777.0 |  | 1,325.1 | 1,394.6 | 1,464.1 |  | -65.8 | 218.5 | 502.9 |  | -184.8 | -96.3 | -7.7 |
| 2016 | 1,628.1 | 1,899.0 | 2,169.8 |  | 1,478.8 | 1,556.4 | 1,634.0 |  | -77.9 | 242.2 | 562.3 |  | 31.7 | 100.4 | 169.0 |
| 2017 | 2,007.7 | 2,293.2 | 2,578.7 |   | 1,638.1 | 1,724.1 | 1,810.1 |   | -91.6 | 266.6 | 624.7 |   | 236.5 | 302.6 | 368.6 |
| **Total** | **10,218.4** | **12,114.6** | **14,010.6** |  | **9,230.7** | **9,712.2** | **10,194.1** |  | **-436.6** | **1,537.4** | **3,511.5** |  | **188.1** | **864.9** | **1,541.4** |

**8c. Max-LARC scenario – pregnancies averted by age**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Overall |  | By delays in age at first sexual intercourse |  | By reductions in partner # |  | By changes in contraception use |
|  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |
| 14 | -16,360 | -12,151 | -7,942 |  | 20,756 | 21,839 | 22,922 |  | -528 | 2,102 | 4,732 |  | -40,210 | -36,092 | -31,974 |
| 15 | 8,763 | 16,966 | 25,169 |  | 54,299 | 57,171 | 60,043 |  | -1,704 | 6,231 | 14,166 |  | -50,689 | -46,436 | -42,183 |
| 16 | 78,210 | 95,070 | 111,930 |  | 92,843 | 97,855 | 102,867 |  | -3,482 | 13,411 | 30,304 |  | -24,154 | -16,196 | -8,238 |
| 17 | 100,441 | 130,609 | 160,777 |  | 130,483 | 137,197 | 143,911 |  | -6,730 | 22,317 | 51,364 |  | -41,516 | -28,905 | -16,294 |
| 18 | 346,141 | 388,232 | 430,323 |   | 172,922 | 182,054 | 191,186 |   | -9,874 | 34,438 | 78,750 |   | 151,887 | 171,740 | 191,593 |
| **Total** | **517,195** | **618,726** | **720,257** |  | **471,303** | **496,116** | **520,929** |  | **-22,318** | **78,499** | **179,316** |  | **-4,682** | **44,111** | **92,904** |

**8d. Max-LARC scenario – costs averted by age (in US $ millions)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Overall |  | By delays in age at first sexual intercourse |  | By reductions in partner # |  | By changes in contraception use |
|  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |  | Lower | Main | Upper |
| 14 | -322.9 | -239.9 | -156.9 |  | 406.7 | 428.0 | 449.3 |  | -10.3 | 41.2 | 92.6 |  | -790.5 | -709.1 | -627.7 |
| 15 | 175.1 | 336.0 | 497.0 |  | 1,063.7 | 1,120.0 | 1,176.3 |  | -33.2 | 122.0 | 277.3 |  | -990.2 | -906.0 | -821.8 |
| 16 | 1,508.3 | 1,840.1 | 2,172.0 |  | 1,818.0 | 1,916.1 | 2,014.3 |  | -67.9 | 262.7 | 593.2 |  | -496.0 | -338.6 | -181.3 |
| 17 | 1,973.1 | 2,565.4 | 3,157.8 |  | 2,554.1 | 2,685.5 | 2,816.9 |  | -131.4 | 437.1 | 1,005.5 |  | -806.6 | -557.2 | -307.7 |
| 18 | 6,785.5 | 7,612.8 | 8,440.2 |   | 3,384.1 | 3,562.7 | 3,741.4 |   | -192.8 | 674.5 | 1,541.7 |   | 2,982.2 | 3,375.6 | 3,769.0 |
| **Total** | **10,119.1** | **12,114.4** | **14,110.1** |  | **9,226.6** | **9,712.3** | **10,198.2** |  | **-435.6** | **1,537.5** | **3,510.3** |  | **-101.1** | **864.7** | **1,830.5** |

# Table S9: Numerical model results: scenarios varying only LARC use, med-LARC scenarios

**9a. Pregnancies averted by LARC use by age**

|  |
| --- |
| LARC use replaces |
| Age | All methods | Withdrawal | Condoms | Pills |
| 14 | 2,541 | 2,691 | 1,739 | 917 |
| 15 | 5,377 | 4,881 | 3,160 | 1,713 |
| 16 | 17,676 | 16,115 | 10,423 | 5,503 |
| 17 | 28,416 | 26,932 | 17,415 | 9,194 |
| 18 | 61,965 | 50,783 | 32,825 | 17,326 |
| **Total** | **115,975** | **101,402** | **65,562** | **34,653** |

**9b. Costs averted by LARC use by age (in US $ millions)**

|  |  |
| --- | --- |
|  | LARC use replaces |
| Age | All methods | Withdrawal | Condoms | Pills |
| 14 | 49.0 | 51.9 | 33.6 | 17.7 |
| 15 | 104.7 | 95.0 | 61.5 | 33.3 |
| 16 | 343.0 | 312.7 | 202.3 | 106.8 |
| 17 | 552.1 | 523.3 | 338.4 | 178.6 |
| 18 | 1,211.0 | 992.5 | 641.5 | 338.6 |
| **Total** | **2,259.8** | **1,975.4** | **1,277.2** | **675.1** |

# Figure S1: Estimated number of pregnancies averted by long-acting reversible contraception (LARC)



Panels represent scenarios in which LARC use replaces (A) all other methods in proportion to their usage; (B) withdrawal; (C) condoms; (D) pills. For each panel, the central line represents the med-LARC scenario, and the upper and lower bounds represent the max-LARC and min-LARC scenarios, respectively; see the text for more information on these scenarios.

# Figure S2: Comparison of predicted live births to reported live births in the National Vital Statistics System (NVSS)

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# References

[1] Goodreau SM, Pollock ED, Wang LY, et al. Predicting the impact of sexual behavior change on adolescent STI in the US and New York State: a case study of the teen-SPARC tool. Annals of epidemiology 2020;47:13-18.

[2] Goodreau SM, Pollock ED, Wang LY, et al. Impacts of Changing Sexual Behavior on Chlamydia and Gonorrhea Burden Among US High School Students, 2007 to 2017. Sexually transmitted diseases 2021;48:635-642.

[3] Goodreau SM, Pollock ED, Wang LY, et al. Impacts of changing sexual behavior on chlamydia and gonorrhea burden among US high school students, 2007-2017. Sex Transm Dis 2021.

[4] Trussell J, Aiken A, Micks E, et al. Efficacy, safety, and personal considerations. In: Hatcher R, Nelson A, Trussell J, et al., eds. Contraceptive technology, 21st edition. New York: Ayer Company Publishers, Inc., 2018.

[5] Peipert JF, Madden T, Allsworth JE, et al. Preventing unintended pregnancies by providing no-cost contraception. Obstet Gynecol 2012;120:1291-1297.

[6] Mestad R, Secura G, Allsworth JE, et al. Acceptance of long-acting reversible contraceptive methods by adolescent participants in the Contraceptive CHOICE Project. Contraception 2011;84:493-498.

[7] Martinez GM, Abma JC. Sexual Activity and Contraceptive Use Among Teenagers Aged 15-19 in the United States, 2015-2017. NCHS data brief 2020:1-8.

[8] Centers for Disease Control and Prevention. Sexually transmitted disease surveillance 2013. https://[www.cdc.gov/std/stats/archive/Surv2013-Print.pdf](http://www.cdc.gov/std/stats/archive/Surv2013-Print.pdf). Atlanta, 2014.

[9] Martin JA, Hamilton BE, Sutton PD, et al. Births: final data for 2007. Natl Vital Stat Rep 2010;58:1-85.

[10] Maddow-Zimet I, Kost K, Finn S. Pregnancies, births and abortions in the United States, 1973–2016: National and state trends by age. https://[www.guttmacher.org/report/pregnancies-births-abortions-in-united-states-1973-2016](http://www.guttmacher.org/report/pregnancies-births-abortions-in-united-states-1973-2016). New York: Guttmacher Institute, 2020.

[11] Centers for Disease Control and Prevention. National Health Interview Survey. See Appendix I, National Health Interview Survey (NHIS). Available at https://[www.cdc.gov/nchs/hus/contents2018.htm#Figure\_019.](http://www.cdc.gov/nchs/hus/contents2018.htm#Figure_019.), 2018.

[12] Hoffman SD, Maynard RA. Kids having kids: Economic costs & social consequences of teen pregnancy. Washington, D.C.: The Urban Insitute, 2008.

[13] Bureau of Labor Statistics. Consumer price index for all urban consumers. Available at: <http://www.bls.gov/cpi/data.htm>. Accessed August 9, 2020.

[14] Bureau of Labor Statistics. Medical Care Component of the consumer price index. Available at: <http://www.bls.gov/cpi/data.htm>. Accessed August 9, 2020.