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Trends in cervical cancer screening in California's family planning program

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Abstract

Objectives—Guidelines recommend 3-year cervical cancer screening intervals to avoid unnecessary invasive procedures; however, regular testing remains critical. We evaluated trends in cervical cancer screening among low-income women receiving family planning-related services and their association with patient and provider characteristics.

Methods—Using claims and enrollment data from California's publicly funded family planning program, we identified 540,026 women with a clinician visit at 216 sites between 2011 through 2015. We calculated guideline adherent cervical cancer testing rates for six-month periods among women ages 21–24, 25–29, and 30–64. We also calculated guideline adherent chlamydia testing for women ages 21–24.

Results—Having a 3-year cervical cancer screening test declined for all age groups. The odds of cervical cancer screening declined for women ages 21–24 by an estimated 11% every six months (odds ratio [OR]: 0.90; 95% confidence interval [CI]: 0.89–0.90), a significantly greater decline than for the other age groups. Among women ages 21–29, the decrease was significantly larger for

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Declaration of Interests

The authors declare no potential conflicts of interest.

IRB approval: The University of California Los Angeles and the University of California San Francisco Institutional Review Boards, California's Committee for the Protection of Human Subjects and the Data Research Committee of the California Department of Health Care Services approved this study.

Latina (ratio of ORs 0.95, 95% CI 0.95–0.96) and Spanish-speaking (ratio of ORs 0.95, 95% CI 0.95–0.96) women compared to non-Latina and non-Spanish speaking women. A smaller decline was seen for chlamydia screening.

Conclusions—Changes in screening interval guidelines are associated with overall decreased screening. This trend was strongest among women ages 21–24 years, even as they continued to be screened appropriately for chlamydia, suggesting many missed opportunities. Efforts to reduce unnecessary cervical cancer screening should be monitored to maintain appropriate screening rates to avoid advanced-stage diagnoses and higher health care costs.

Keywords

cervical cytology screening; chlamydia screening; Medicaid; Latinas; immigrants

INTRODUCTION

Cervical cancer screening decreases cervical cancer mortality[1]; however, not all populations have equally benefited. Disproportionately low rates of cervical cytology testing and elevated cancer incidence and mortality have been documented among minority, immigrant, and uninsured women.[2–6] In 2013, Latinas had the highest incidence rates of cervical cancer (9.4 per 100,000 vs. 8.9 per 100,000 for African Americans and 7.5 per 100,000 for non-Latino whites), and African American and Latina women had the highest cervical cancer mortality rates (3.9 per 100,000 and 2.6 per 100,000, respectively, vs. 2.1 per 100,000 for non-Latino whites).[6]

For decades, cervical cancer screening guidelines recommended annual screening. However, cervical cytology has a relatively low sensitivity, resulting in needless invasive procedures for many women that have been associated with premature delivery and emotional distress.[7,8] As a result, by 2012, U.S. Preventive Services Task Force and the American Cancer Society in collaboration with American Society for Colposcopy and Cervical Pathology and American Society for Clinical Pathology independently issued revised guidelines--both recommending screening to start at 21 years and end at 65 years of age and intervals every 3 years when using cytology alone and specifically advised against annual screenings.[9–12] Healthy People set as an objective that, by 2020, 93% of females aged 21 to 65 years should receive cervical cancer screening based on the most recent guidelines.[13]

Nationwide, the percentage of women aged 21–65 who had a cervical cancer screening test in the past three years showed a small decline from 81% in 2010 to 79% in 2015.[14] This trend may have been impacted by changes in access to women's health services, confusion in changing guidelines, or difficulty in remembering screening due dates.

In this analysis, we used California's Family Planning, Access, Care, and Treatment (Family PACT) program claims and program enrollment data to examine trends in and correlates of guideline adherent cervical cancer screening among women who used publicly funded family planning services.[15] In 2013, the Family PACT program disseminated the information to its provider base of over 2,200 sites in California.[22]

We also hypothesized that the replacement of pelvic examination chlamydia screening with urine or self-swab potentially discouraged clinicians to conduct a speculum examination for the cervical cytology screening. In this case, urine-based annual chlamydia testing for women aged 21–24 years would not show a similar decrease over the years. We therefore additionally assessed trends in rates of guideline-supported chlamydia screening practices for women aged 21–24 years during the analysis period to identify potential missed cervical cancer screening opportunities.

METHODS

Study Data and Design

We analyzed Family PACT fee-for-service paid claims and program enrollment data from 2011 to 2015. By design of the program, all women selected were eligible for no-cost family planning-related services for at least one year and had been seen by a clinician provider for a family planning-related visit at least once (see Supplement for definitions of provider and visits). For these women, we examined cervical cytology test and chlamydia test claims paid by the Family PACT program to laboratories (see Supplement for test definitions). The University of California Los Angeles and the University of California San Francisco Institutional Review Boards, California's Committee for the Protection of Human Subjects and the Data Research Committee of the California Department of Health Care Services approved this study.

Sample

As part of a comprehensive intervention study, we identified 243 Family PACT enrolled clinic sites located in ten mostly Southern California counties that had sufficiently large data volume just prior to the July 2015 intervention start (see Supplement for details on 'sufficient data volume'). These Family PACT clinic sites were public sector providers such as Federally Qualified Health Centers and county health departments as well as private group and solo medical practices. No Planned Parenthood health centers were included because they have a unique monitoring and tracking system for cervical cancer screening. Of these 243 sites, we excluded 27 sites who served less than one female ages 21–29 bi-annually and/or were not enrolled during the entire 2011–2015 analysis time frame, resulting in 216 clinic sites (Figure 1).

We defined the patient population among the 216 sites as the 661,345 females who had at least one family-planning clinician visit between July 1, 2011, and June 30, 2015. We excluded 378 women because they had incomplete demographic information such as date of birth. Data for 121,319 women outside ages 21–64 during each index period were also excluded, resulting in a final sample size of 540,026 women. Women under 21 years of age were not included in the analysis because Family PACT restricted reimbursement for cervical cytology testing for women under 21 years in July 2013. Women over 65 years were also excluded since the guidelines recommend to stop screening at age 65 years if there is known history of normal cytology.

Cervical Cancer Screening Measures

The main outcome was cervical cytology test claims that were consistent with screening guidelines (see Supplement for details on cervical cytology test claims). For each of the eight 6-month visit periods, we calculated rates of 3-year and 1-year cervical cancer screening. Because the screening guideline intervals changed during the observation period (i.e., annual screening was recommended in 2011–2012 and triennial screening from 2013–2015), we examined (a) rates consistent with annual screening and (b) rates consistent with triennial screening. The denominator for each measure was the number of women in the selected age group (21–24, 25–29, 30–64 years) who had at least one clinician visit in the six-month visit period, and the numerator was the number of women who had at least one cervical cytology test claimed within the six-month visit period or 1 year prior (for annual screening) or 3 years prior (for triennial screening). Our look-back period ensures a minimum of 1-year (maximum 18 months) and 3-year (maximum 42 months) cervical cytology test window for every woman, regardless of the timing of her clinician visit(s) within the 6-month visit period.

Our 3-year cervical cancer screening measure is generally comparable to the structure of the National Quality Forum endorsed Healthcare Effectiveness Data and Information Set (HEDIS) measure of cervical cancer screening.[16,17] There are three primary differences. First, we used a six-month measurement period rather than calendar year. Second, our denominator included women actually seen by a clinician in the context of a family planning-related visit when they were at least age 21 in contrast to solely being eligible for such a visit. Finally, we did not additionally assess human papillomavirus (HPV) co-testing every 5 years for women ages 30–64. HPV co-testing was not a Family PACT recommended clinical practice for the majority of the study period, and exploratory analyses revealed including HPV test data in our measure would have resulted in only marginally higher rates of screening for the older age groups.[18]

Chlamydia Screening

We also conducted a sub-analysis on annual chlamydia screening among young women to explore whether trends in cervical cancer screening paralleled those in preventive testing. California Sexually Transmitted Disease screening recommendations advise annual testing for chlamydia for women ages 21–24.[19] We therefore calculated the number of women in this age group who were screened for chlamydia and defined missed opportunity as the number of women who were screened for chlamydia but not cervical cancer. We limited the study observation period to June 2012 to June 2015 as we did not receive chlamydia testing data for 2011. For each six-month visit period, we calculated rates of chlamydia screening. The denominator was the number of women ages 21–24 who had at least one clinician visit in the six-month visit period, and the numerator was the number of women who had at least one chlamydia test within the six-month visit period or one year prior (see Supplement for details on chlamydia test). Our look-back period ensures a minimum 1-year (maximum 18 months) chlamydia test window for every woman, regardless of the timing of her clinician visit(s) within the 6-month visit period.

Patient and Clinic Characteristics

We obtained patient characteristics, including race/ethnicity, primary language, and age group from Family PACT client enrollment data. A client was defined to a single provider based on her first clinician visit date with one of 216 selected sites between July 2011 and June 2015. Age was calculated based on the first day of first six-month visit period in which she was 21 through 64 years old. Clinic site characteristics county and site type (private vs. public) were derived from provider enrollment data. To classify geography type (urban vs. rural), we used information from the most current clinical site address and matched it to the Medical Service Study Areas (MSSA) definition.[20] Urban MSSAs were defined as a population range of 75,000 to 125,000 persons, and rural MSSAs had a population density of less than 250 persons per square mile. Clinic site address from most recent enrollment record was also used to capture enrollment in Every Woman Counts (EWC), another state program that covers preventive cancer screenings for uninsured low-income women.[21]

Statistical Analyses

We prepared descriptive statistics to describe client and provider characteristics as well as the percentage of women receiving guideline-specific cervical cancer and chlamydia screening by client and provider characteristics. We used logistic regression models to estimate subpopulation-specific trends in 3-year cervical cancer screening over time and to compare trends between subgroups. Each model included a linear time effect (in 6-month increments), a fixed subgroup effect, and a subgroup-by-time interaction term. This method was also used for comparing the decline rate of 3-year cervical cancer screening versus rate of annual chlamydia screening. Trends were estimated using model contrasts, and were summarized in terms of odds ratios and 95% confidence intervals. Differences in trends between subgroups were summarized in terms of odds ratios (ORs), 95% confidence intervals (CI), and p-values. Statistical significance was defined as a p-value less than 0.05. All analyses were performed using R version 3.3.2 (R: A language and environment for statistical computing. R Core Team. R Foundation for Statistical Computing. 2017. Vienna, Austria).

Role of the Funding Source

The study sponsor did not play a role in the study design; data collection, analysis, or interpretation; writing of the report; or decision to submit the paper for publication. The corresponding author had final responsibility for the decision to submit for publication.

RESULTS

The final sample included 540,026 women from 216 sites. About half were under 30 years of age, and the majority of women was Latina and spoke Spanish as their primary language. Almost all women received care from sites that were urban, over half received care from private clinics and those located in Los Angeles County, and approximately two in five saw a provider enrolled in Every Woman Counts (Table 1). Although sample sizes varied for each six-month visit period (Figure 1), the distribution of patient and clinic characteristics was consistent across visit periods (data not shown).

Cervical cancer screening trends

Figure 2a shows unadjusted rates of 1-year cervical cancer screening by age group. Trends declined for all three groups (21–24, 25–29, 30–64 years), with the greatest decline observed among the youngest women. During each visit period, a lower proportion of the youngest women (21–24 years) were screened compared to older women (25–29 or 30–64 years). For example, in 2015, 38% of women ages 21–24 had a 1-year screening test compared with 49% of women ages 30–64.

The unadjusted rates of 3-year cervical cancer screening by age group also revealed a decrease among all age groups with a significant greater decline in young women (Figure 2b). In 2015, 50% of women ages 21–24 years were screened compared with 76% of women ages 30–64.

Table 2 presents overall and subpopulation-specific trends in 3-year cervical cancer screening. Between 2011 and 2015, 3-year cervical cancer screening declined overall and within each subgroup. With respect to age, the odds of cervical cancer screening declined for women ages 21–24 years by an estimated 11% every six months during the observation period (OR: 0.90; 95% CI: 0.89–0.90). The rate of decline for this youngest group was significantly greater than for those ages 25–29 years (ratio of ORs: 1.02; 95% CI: 1.01–1.02) and those ages 30–64 years (OR: 1.01; 95% CI: 1.01–1.02). There was no difference in trend, however, between women ages 30–64 versus 25–29 years (OR: 1.00; 95% CI 0.99–1.00).

Among women ages 21–29 years, declining trends were greater for women who were Latina, Spanish-speaking, and who were served by a site located in Los Angeles or not enrolled in Every Woman Counts (all ps<0.001). For example, the odds of receiving a 3-year cervical cancer screening among Latinas declined by an estimated 10% every six months (OR: 0.90; 95% CI 0.90–0.90), compared to only 6% for non-Latina women (OR: 0.94; 95% 0.94–0.95), and the difference in these rates of decline was significant (ratio of ORs: 0.95; 95%CI 0.95–0.96). Trends did not differ significantly by provider type (public vs. private sector) or geography (urban vs. rural) (eFigure1).

Chlamydia screening among young women

Unadjusted rates of 3-year cervical cytology screening and annual chlamydia screening among all women ages 21–24 are displayed in Figure 3. Trends showed a more modest decline for chlamydia screening compared to the large decline for cervical cancer screening. The difference in decline rate between chlamydia and cervical cancer screening is statistically significant (p<0.001). Young women being screened for both chlamydia and cervical cancer declined between 2011 and 2015 (eFigure2).

DISCUSSION

Regular cervical cytology tests contributed to the decrease in cervical cancer mortality through early diagnosis of cervical precancers.[1] Healthy People 2020 targets increasing the proportion of women who receive a cervical cancer screening based on most recent guidelines from 84% in 2008 to 93% in 2020.[22] With the change in guidelines from annual

to every three years, a decrease in annual screening was expected. Disturbingly, our data show a decreasing trend in the percent of women who had even one cervical cytology screening within three years, which coincided with the change in guidelines from annual to every 3 years. While this observation is consistent with other studies,[23,24] the decline was particularly alarming for women in the younger age group. Only 50% of women ages 21–24 seen by a Family PACT provider in early 2015 had cervical cancer testing within the six-month visit period or three years prior compared to 69% of women ages 25–29 years and three-quarters of women aged 30–64 years. Moreover, all age groups were well below the Healthy People 2020 target. Of note, during 2011–2012, when annual screening was the recommended guideline, three quarters of young women had cervical cancer testing within the six-month visit period or one year prior.

In our analysis, the decline in recommended cervical cytology screening was significantly stronger among Latina women compared to non-Latina women. Nationwide, the percentage of women screened in 2015 was lowest among Latinas at 76% compared with 80% among non-Latina Whites and 83% among non-Hispanic Blacks.[14] Racial/ethnic health disparities in cervical cancer incidence and mortality could widen, if adoption of new screening guidelines leads to a differential decrease in screening among Latinas and other minority groups.

Clinic sites that participated in the Every Woman Counts program, a potential alternative payer for cervical cytology tests for uninsured low-income women, had a higher percentage of young women in the Family PACT program who were appropriately tested than sites that were not enrolled. This finding may be attributable to higher awareness among clinicians working at EWC sites about the need to screen for cervical cancer. There were no differences by provider type (public clinic vs. private solo and group medical practices) or clinic geography (urban vs. rural location), although the decrease in cervical cancer screening was more pronounced in Los Angeles County compared with the other nine California counties.

One explanation for the decline in cervical cancer screening may be the reduced use of pelvic examinations during family planning visits, which had allowed clinicians to offer cytology testing without the need to take any additional steps. The American College of Obstetrics and Gynecology advised in 2015 that there is no safety or medical benefit in requiring pelvic exams or cervical cytology tests when dispensing hormonal contraception.[25] Currently, guidelines for chlamydia screening include self-obtained vaginal swabs or urine tests[26], which discourages pelvic examinations. In our analysis, guideline-specific chlamydia screening had little change, showing that reproductive health care visits were not on the decline in these clinics. It is probable that most of these young women never had a pelvic examination as adolescents and, when offered as a young adult, declined or deferred their examination because of perceived discomfort. We also do not know how many women in this sample received the HPV vaccine and whether they erroneously assumed that the vaccine protected them from cervical cancer screening. Interestingly, a recent study in Canada reported a decline in chlamydia testing that paralleled the introduction of revised cervical cancer guidelines,[27] although an analysis of aggregate data among Title X clinics did not found a decrease in chlamydia testing corresponding to decreased cervical cancer

screening.[28] It appears that greater effort towards educating young women regarding cervical cancer is needed. In addition, quality improvement activities within clinics should target missed opportunities for cervical cancer screening during reproductive health visits and adherence with recommended screening and management.[29]

For women of all ages, remembering the new screening interval of every 3 years is challenging as compared to annually where the testing date could be pegged to a life event such as birthday, holiday, or anniversary. Equally, it may be difficult for providers to adhere to clinical guidelines that differ by client age unless prompted by a clinic protocol. An analysis of chlamydia screening in the Family PACT program found that providers did not consistently adhere to age-specific guidelines that required annual testing of women under 25 years and only risk-specific screening of women 25 years and over.[30,,31] Medical record systems that provide reminders of upcoming screening tests to clinicians or patients could facilitate adherence to triennial screening guidelines. This study of Family PACT providers included a diverse group of public clinics and private group offices with widely varying practice management systems that show the challenges of successfully implementing new clinical guidelines.

The strength of this study is the use of claims data, which avoid recall or social desirability bias observed in surveys. However, claims data do not capture screening tests for which claims were unpaid or never submitted or tests that were received outside Family PACT. Thus, our results may have underestimated cervical cancer screening, albeit not differentially between periods. In addition, variables that may vary across age groups and influence patients' desire for more frequent cervical cytology tests such as having a previous positive cervical cytology result or a family member with cancer could not be assessed in this analysis.

Clinical screening guidelines that seek to avoid unnecessary cervical cytology testing may impact recommended public health screening frequency, hampering the ability of early detection of cancer. Furthermore, the decrease of pelvic examinations during family planning visits may have inadvertently influenced the observed decline in adherence to cervical cancer screening by both patients and providers. Cervical cancer screening programs need to target young adult women.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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Abbreviations and Acronyms

OR	Odds Ratio
CI	Confidence Interval
Family PACT	Family Planning Access Care Treatment
HEDIS	Healthcare Effectiveness Data and Information Set
MSSA	Medical Service Study Areas
EWC	Every Woman Counts

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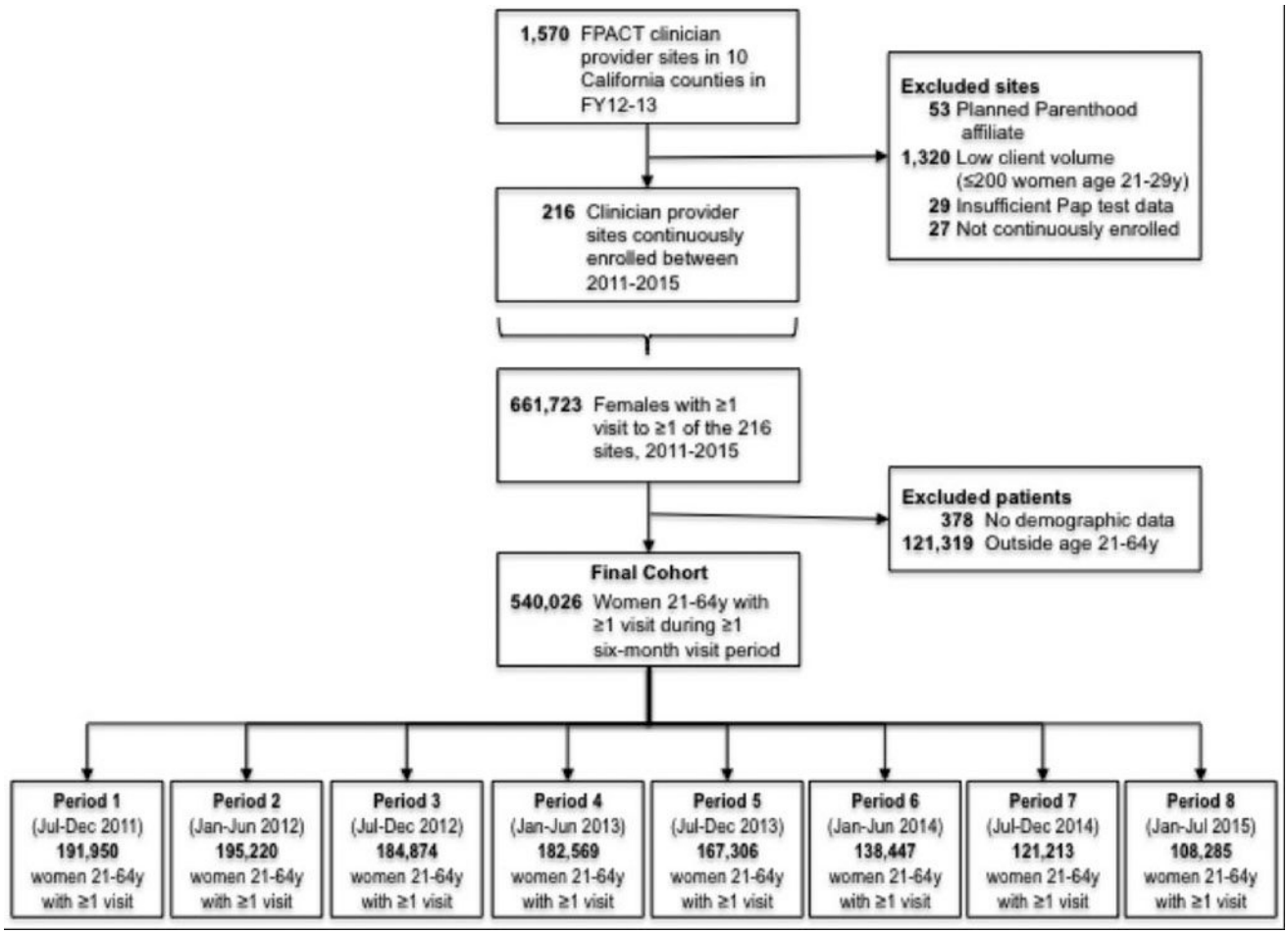
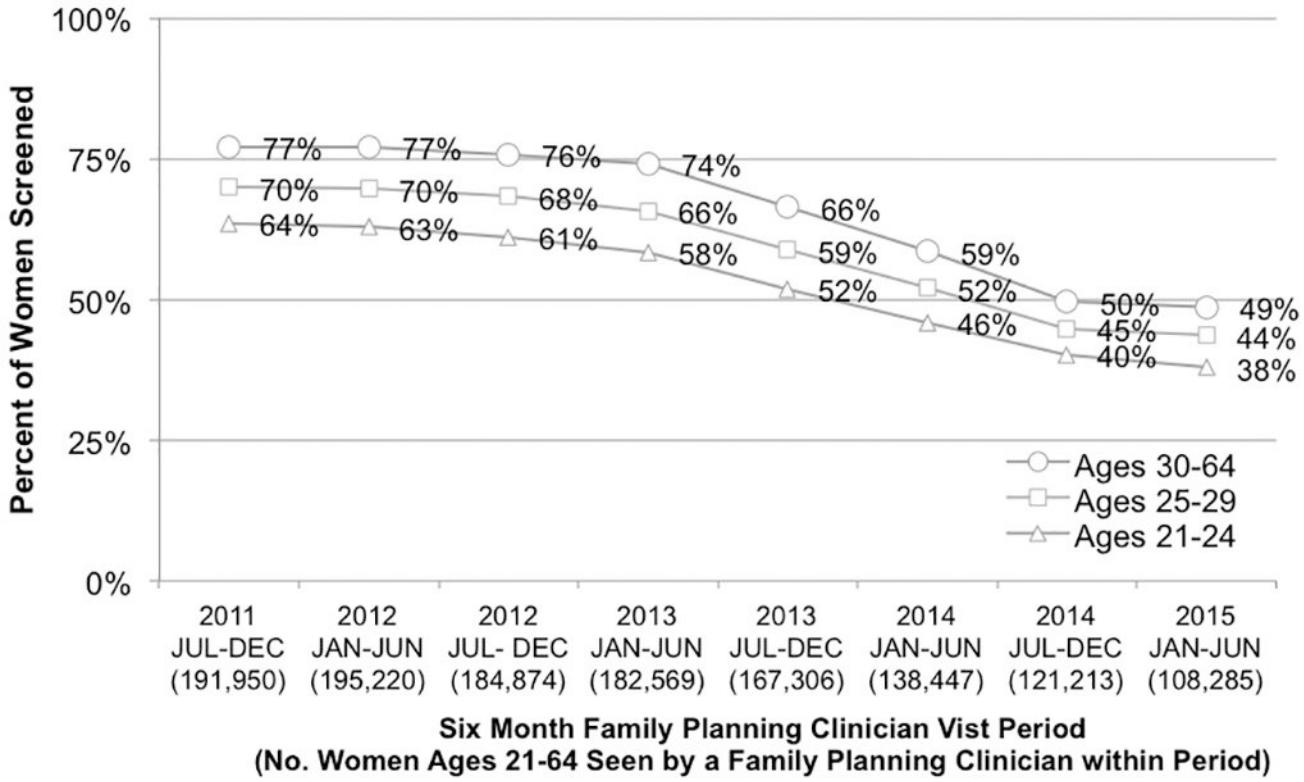


Figure 1.



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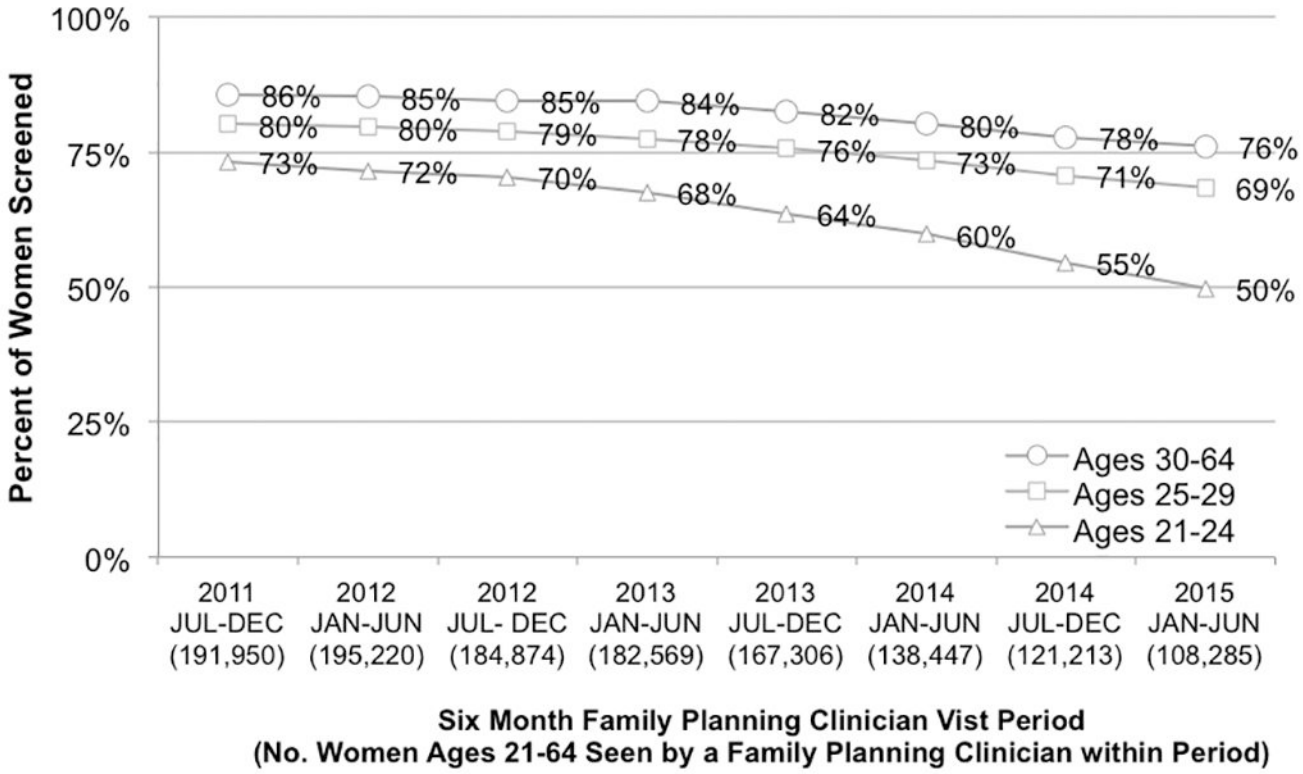

Figure 3.

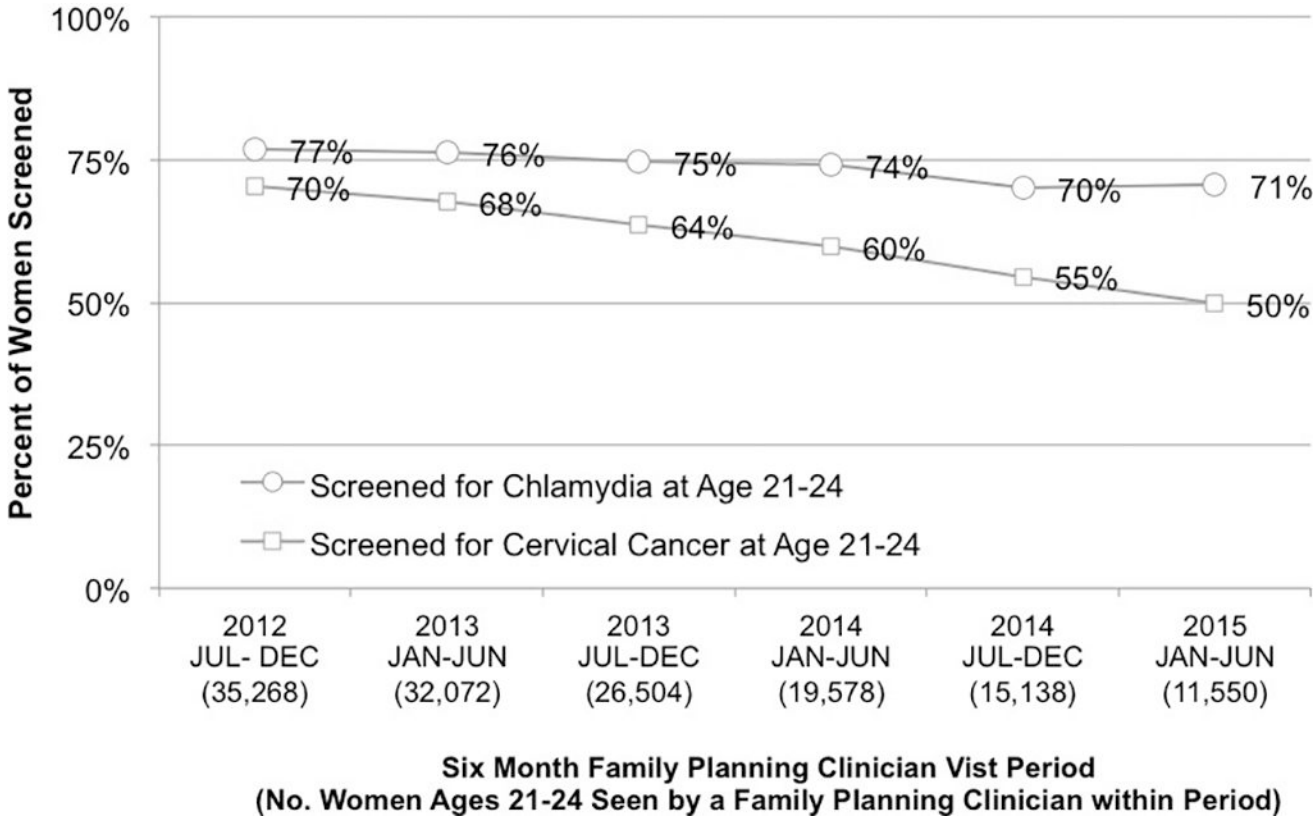

Figure 4.

Table 1

Baseline Sample Characteristics of Women with Clinician Visit, 2011 to 2015[a]

	No. (%)
No. of patients	540,026 (100)
Age at first visit, y[b]	
21 – 24	115,198 (21)
25 – 29	126,072 (23)
30 – 44	246,219 (46)
45 – 64	52,537 (10)
Race/Ethnicity	
Latina	444,939 (82)
Non-Latina	95,087 (18)
Primary Language	
Spanish	350,255 (65)
Non-Spanish	189,771 (35)
Provider Geography	
Urban (208 sites)	528,007 (98)
Rural (8 sites)	12,019 (2)
Provider Type	
Private (126 sites)	303,870 (56)
Public (90 sites)	236,156 (44)
Provider County[c]	
Los Angeles (126 sites)	323,357 (60)
Non-Los Angeles (90 sites)	216,669 (40)
Every Woman Counts Provider	
Yes (82 sites)	227,237 (42)
No (134 sites)	312,789 (58)

Percentages may not sum to 100 due to rounding.

[a]Women who had one or more visit(s) to one or more of the 216 selected site(s) between July 2011 – June 2015 while ages 21 through 64 years Provider characteristics are assigned to women based on first clinician visit date to a selected site.

[b]Age calculated based on the first day of first six-month visit period in which she was 21 through 64 years old

[c]The ten California counties selected included Los Angeles, Orange, San Diego, Riverside, Santa Barbara, San Bernardino, Imperial, Kern, Ventura, and Fresno.

Table 2

Association between Client and Clinic Characteristics and 3-Year Cervical Cancer Screening Trend, 2011 to 2015

(+6 Months)	OR (95% CI)	Ratio (95% CI)	*P Value*
Women ages 21–64			
Age, y			
21–24	0.90 (0.89, 0.90)		
25–29	0.91 (0.91, 0.92)		
30–64	0.91 (0.91, 0.91)		
25–29 v. 21–24		1.02 (1.01, 1.02)	<**0.001**
30–64 v. 21–24		1.01 (1.01, 1.02)	<**0.001**
30–64 v. 25–29		1.00 (0.99, 1.00)	0.118
Women ages 21–29			
Race/Ethnicity			
Latina	0.90 (0.90, 0.90)	0.95 (0.95, 0.96)	<**0.001**
Non-Latina	0.94 (0.94, 0.95)		
Primary Language			
Spanish	0.89 (0.88, 0.89)	0.95 (0.95, 0.96)	<**0.001**
Non-Spanish	0.93 (0.93, 0.93)		
Provider Geography			
Urban	0.91 (0.90, 0.91)	0.99 (0.97, 1.01)	0.291
Rural	0.92 (0.90, 0.93)		
Provider Type			
Public	0.91 (0.90, 0.91)	1.00 (0.99, 1.01)	0.840
Private	0.91 (0.90, 0.91)		
Provider County			
Los Angeles	0.89 (0.89, 0.90)	0.96 (0.95, 0.96)	<**0.001**
Non-Los Angeles	0.93 (0.93, 0.94)		
Every Woman Counts Provider			
Yes	0.93 (0.92, 0.93)	1.03 (1.02, 1.04)	<**0.001**
No	0.90 (0.90, 0.90)		

[a]All women ages 21 through 64 years