Journal of Adolescent Health 53 (2013) 401–406

ELSEVIER

JOURNAL OF ADOLESCENT HEALTH

www.jahonline.org

Original article

Use of the Intrauterine Device Among Adolescent and Young Adult Women in the United States From 2002 to 2010

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Article history: Received December 22, 2012; Accepted April 19, 2013
Keywords: Adolescent; Contraception; IUD (intrauterine device); Contraceptive use; NSFG (National Survey of Family Growth)

A B S T R A C T

Purpose: Long-acting contraceptives, such as the intrauterine device (IUD), show potential for decreasing the incidence of unintended pregnancy. However, use among adolescent and young adult women remains low. We determined factors associated with IUD use among young women.
Methods: We conducted an analysis of nationally representative, cross-sectional data from the 2002 and 2006–2010 National Surveys of Family Growth. We included sexually active women 15–24 years old. We used bivariate analysis to compare proportions of ever-use of any type of IUD in 2002 and in 2006–2010 and multivariable logistic regression to identify correlates of ever-use in 2006–2010.
Results: We found an increase in IUD use in teens 15–19 years old, from .2% to 2.5% ($p < .001$), and among women 20–24 years old, 2.0% to 5.4% ($p < .001$). Use increased among nearly all subgroups of respondents. Compared with nulliparous young women, those with one prior delivery and with two or more deliveries were substantially more likely to have used an IUD (adjusted OR 11.43, 95% CI 3.61–36.16, and adjusted OR 13.60, 95% CI 4–46.48, respectively). Young black women were less likely to report IUD use (adjusted OR .32, 95% CI .16–.66), and women whose mothers received at least a high school education were more likely to report use (adjusted OR 2.56, 95% CI 1.22–5.43).
Conclusions: IUD use is increasing among adolescent and young adult women overall and among almost all sociodemographic subgroups. Nonetheless, use remains low, and nulliparous young women are highly unlikely to use the IUD.

IMPLICATIONS AND CONTRIBUTION

IUDs provide safe and effective contraception for adolescents, a population at high risk of unintended pregnancy. This study examines recent national trends in IUD use and identifies subgroups of young women who remain unlikely to use the IUD. Our findings can inform interventions to increase use among this population.

Adolescent birth rates in the United States reached historic lows in 2010, having declined 44% since their peak in 1991 [1]. Although this progress is promising, the United States continues to have higher rates of adolescent pregnancy than other developed nations [2]. In 2010, 34.3 per 1,000 women aged 15–19 years gave birth, and 82% of all births to this age group are unintended [1]. More than one unintended pregnancy occurs for every 10 women between 18 and 24 years of age [3]. There are important disparities in rates of adolescent pregnancy, with the probability of a first birth by age 18 years being more than twice as high for black and Hispanic young women as for their white peers [4].

There are public health consequences of adolescent and of unintended pregnancy. Children of adolescent mothers are at risk for low birth weight, preterm birth, and associated health problems [5]. Women who give birth as teenagers are less likely

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1054-139X/$ – see front matter
http://dx.doi.org/10.1016/j.jadohealth.2013.04.011

to complete high school, resulting in economic disadvantage for themselves and their children [6]. Women who continue unintended pregnancies are more likely to delay prenatal care, consume less than the recommended amount of folic acid, smoke pre- and postnatally, and deliver preterm. They are also at a higher risk for postpartum depression compared with women with intended pregnancies [7,8]. Unintended pregnancy has implications for taxpayers as well. An estimated 64% of births resulting from unintended pregnancies are publically funded, compared with 35% of births resulting from intended pregnancies. Unintended births account for $11.1 billion in public expenditures [9].

A large portion of the recent decline in adolescent birthrates is attributable to increased contraceptive use [10]. Although oral contraceptive pills remain the most common hormonal method of contraception among young women, use of non-oral hormonal methods is increasing [2]. However, adolescent and young adult women have high rates of discontinuation of hormonal methods, putting them at risk of unintended pregnancy [11]. Data from the 2004–2008 Pregnancy Risk Assessment Monitoring System (PRAMS) indicates that 45.2% of young women 15–19 years old who experience a live birth have used moderately or very effective contraceptive methods in the past [12], suggesting that these adolescents struggled with method use or adherence.

Long-acting reversible contraceptive (LARC) methods are recommended for use in young women to prevent pregnancy [13,14], and have shown promise in reducing unintended pregnancy [15–17]. Although LARC methods are proving more acceptable among adolescents and young women, overall use remains low. From 2002 to 2008, current use of the intrauterine device (IUD) rose from nearly none to 3.6% among 15–19-year-olds and from 1.8% to 5.9% among 20–24-year-olds [18]. Recent studies have examined factors associated with LARC use [19–22], but have not focused on young women. This study is an update to our analysis of correlates of IUD use among young women in the 2002 National Survey of Family Growth (NSFG) [23]. Factors associated with use of LARC methods among adolescent and young adult women likely vary over time, especially as more young women choose these options. We examine changes in factors associated with IUD use in young women from 2002 to 2010.

Methods

The data for this study come from the 2002 and 2006–2010 cycles of the NSFG, a cross-sectional, nationally representative survey. The NSFG is based on an area probability sample, representing the household population of the United States, 15–44 years of age, with oversampling of women, teens (15–19-year-olds), Hispanics, and African-Americans [24]. In-person, voluntary and confidential interviews were completed in English or Spanish with men and women, but we did not analyze data from male respondents. In 2002, there were 7,643 total female participants and in 2006–2010, there were 12,279. The response rate for women was 80% in 2002 and 78% in 2006–2010. The NSFG includes information on a woman's use of contraception, past pregnancies and pregnancy outcomes, and her social and demographic characteristics. Data were collected by female interviewers in the homes of survey respondents through Computer-assisted Personal Interviewing (CAPI), with Audio Computer Assisted Self-Interviewing (ACASI) technology used for more sensitive questions. Because our analysis was conducted using existing, publicly available, de-identified data, this study was exempt from Institutional Review Board review.

The sample for this analysis included sexually experienced (i.e., having had sexual intercourse at least once) women aged 15–24 years at time of interview. The NSFG contains detailed information on contraceptive use, including whether a respondent reports having ever used each type of contraceptive method. These variables were used to construct our main outcome variable: ever-use of any type of IUD.

We chose our exposure variables based on our prior analysis of the NSFG in order to make a longitudinal comparison [23]. These include sociodemographic variables (e.g., age, race/ethnicity, relationship status, maternal education, income, insurance coverage, religiosity), pregnancy variables (e.g., prior pregnancy history, parity), and sexual history (e.g., age at first intercourse and use of any contraceptive at first intercourse).

We used descriptive statistics to evaluate the demographic and reproductive health characteristics for our sample. We compared these variables between respondents in 2002 and those in 2006–2010 using the chi-squared test for categorical variables and the *t*-test for continuous variables. We performed additional bivariate analysis using the chi-squared test to determine the change in proportion of IUD users from 2002 to 2006–2010 among all women in our analysis and among subpopulations of respondents, based on sociodemographic and reproductive characteristics.

Using only respondents from the 2006–2010 cycle, we calculated unadjusted correlates of ever-use of the IUD using *t*-tests for continuous variables and chi-squared tests for categorical variables. We then performed multivariable analysis using logistic regression to generate adjusted odds ratios (ORs) and 95% confidence intervals (CIs) of correlates of ever-use of the IUD. Variables were initially included in the multivariable model if they were significantly associated ($p \leq .10$) with ever-use of the IUD in bivariate analysis. The final model was limited to variables that maintained significance at $p \leq .10$ after adjustment for the remaining covariates. All data analyses were carried out in Stata/SE 11.2 for Windows (StataCorp LP, College Station, TX) using the "svy" command to account for the NSFG's complex design and oversampling of certain respondent groups.

Results

There were 2,513 women aged 15–24 years interviewed in the 2002 NSFG and 4,382 in 2006–2010. Of these, there were 1,764 and 2,920 unweighted observations, respectively, for women reporting a history of sexual intercourse. Of women in our 2006–2010 analysis sample, 148 (4.5%) had ever used the IUD, an increase from only 1.4% in 2002 ($p < .001$) (Table 1). Among ever-users of the IUD, 68.9% (102/148) reported current use. Compared with the 2002 sample, respondents in 2006–2010 were living closer to the federal poverty level ($p = .02$) and were more likely to report having no or public insurance coverage ($p < .01$).

Among teens (aged 15–19 years) and young adult women (aged 20–24 years), ever-use of the IUD increased significantly, from .2% to 2.5% ($p < .001$) and 2.0% to 5.4% ($p < .001$), respectively (Table 2). Among teens, all of the increase in IUD use was accounted for among older teens aged 18–19 years (.1% to 3.6%, $p < .001$). Use among 17-year-olds did not increase (.8% to .9%, $p = .95$), and no respondents younger than 17 years reported ever having used an IUD in 2002 or in 2006–2010.

Table 1
Characteristics of sexually experienced women aged 15–24 years in the 2002 and 2006–2010 National Surveys of Family Growth

Characteristic	2002 n = 1,764	2006–2010 n = 2,920	*p*
Age (years)	20.5 ± .08	20.6 ± .07	.41
Race			.63
White, non-Hispanic	948 (60.6)	1,407 (57.6)	
Black, non-Hispanic	321 (15.5)	645 (15.5)	
Hispanic	366 (15.8)	629 (17.6)	
Other/Multiracial	129 (8.1)	239 (9.3)	
Born outside the United States	216 (11.2)	297 (10.1)	.43
Mother's educational level			.31
Less than high school graduate	352 (17.9)	593 (18.1)	
Graduated high school or GED	587 (33.6)	905 (30.2)	
Some college[a]	466 (26.5)	841 (29.9)	
Bachelor's degree or higher	350 (22.0)	562 (21.8)	
Marital status			.06
Never married, not cohabitating	1,066 (62.3)	2,033 (65.5)	
Never married, cohabitating	279 (15.4)	475 (17.1)	
Ever married	419 (22.3)	412 (17.5)	
Income as percent of poverty level			.02
<100%	472 (26.3)	1,000 (29.7)	
100%–199%	450 (23.7)	757 (26.1)	
200%–299%	288 (17.2)	488 (18.1)	
≥300%	554 (32.8)	675 (26.2)	
Insurance coverage			<.01
No insurance	344 (18.1)	645 (23.0)	
Medicaid and other government-sponsored	460 (23.5)	945 (26.1)	
Private	960 (58.4)	1,330 (50.9)	
Ever pregnant	827 (42.2)	1,274 (39.6)	.30
Ever had unintended pregnancy	672 (33.8)	1,057 (32.2)	.46
Ever had a teenage pregnancy	630 (31.4)	1,005 (30.5)	.68
Ever had an abortion	186 (9.0)	270 (7.9)	.32
Parity			.41
0	1,140 (69.5)	1,963 (72.0)	
1	394 (19.7)	608 (17.5)	
2 or more	230 (10.9)	349 (10.5)	
Religious affiliation			.25
None	333 (18.4)	676 (21.4)	
Catholic	514 (28.0)	674 (25.2)	
Protestant	826 (48.4)	1,364 (46.6)	
Other	91 (5.3)	206 (6.9)	
Frequency of religious attendance			.03
Never	534 (29.0)	908 (29.4)	
Less than one time per month	496 (28.5)	729 (28.0)	
One to three times per month	286 (17.3)	649 (21.7)	
One time per week or more often	446 (25.3)	631 (20.9)	
Used a method of contraception at first intercourse	1,258 (73.8)	2,259 (78.3)	.02
Age at first intercourse (years)	16.2 ± .11	16.3 ± .09	.47
Number of years sexually active	4.3 ± .11	4.3 ± .09	.94
Ever used an intrauterine device	30 (1.4)	148 (4.5)	<.001
Ever used an implantable method of contraception	12 (.5)	28 (.7)	.53

All data are n (%) or mean ± standard error.
[a] "Some college" includes women with 2-year degrees.

Although ever-use of the IUD remained highest for Hispanic respondents, the increase in use from 2002 to 2006–2010 (4.9% to 7.2%) was not statistically significant ($p = .26$). IUD use in all other racial and ethnic categories increased significantly. Among young women with government-sponsored healthcare plans, including Medicaid, IUD use increased markedly, from .9% to 9.8% ($p < .001$). Use increased significantly among women of all marital statuses, with a greater than 10-fold increase among never-married, non-cohabitating women from .2% in 2002 to 2.6% in 2006–2010 ($p < .001$). Women who had ever been pregnant and who had more children at the time of the survey

Table 2
Percentage of sexually experienced women aged 15–24 years in the 2002 and 2006–2010 National Surveys of Family Growth who have ever used an intrauterine device

Characteristic	2002	2006–2010	*p*
All	1.4	4.5	<.001
Age (years)			
15–19	.2	2.5	<.01
15–17	.4	.4	1.0
15–16	–	–	–
17	.8	.9	.95
18–19	.1	3.6	<.001
20–24	2.0	5.4	<.001
20–21	1.2	4.5	<.01
22–24	2.4	6.0	<.01
Place of birth			
Outside United States	5.7	5.9	.94
Within United States	.8	4.3	<.001
Race			
White, non-Hispanic	.8	4.1	<.001
Black, non-Hispanic	.5	3.7	<.01
Hispanic	4.9	7.2	.26
Other/Multiracial	.4	2.6	.04
Mother's educational level			
Less than high school graduate	3.1	5.1	.25
Graduated high school or GED	1.2	5.6	<.01
Some college[a]	.7	4.3	<.001
Bachelor's degree or higher	.9	2.6	.11
Marital status			
Never married, not cohabitating	.2	2.6	<.001
Never married, cohabitating	2.2	6.0	.03
Ever married	4.1	10.0	.01
Income as percent of poverty level			
<100%	2.4	7.2	<.001
100%–199%	.8	6.1	<.001
200%–299%	1.0	3.2	.05
≥300%	1.1	.6	.20
Insurance coverage			
No insurance	2.4	4.7	.16
Medicaid and other government-sponsored	.9	9.8	<.001
Private	1.2	1.7	.35
Ever pregnant			
Yes	3.0	10.8	<.001
No	.1	.3	.30
Ever had an unintended pregnancy			
Yes	2.9	11.5	<.001
No	.6	1.1	.13
Ever had a teenage pregnancy			
Yes	3.0	12.7	<.001
No	.6	.9	.44
Parity			
0	.2	.5	.19
1	2.1	12.0	<.001
2 or more	7.1	18.9	<.01
Religious affiliation			
None	1.1	5.5	<.01
Catholic	1.9	4.3	.06
Protestant	1.3	4.0	<.01
Other		4.9	.07
Frequency of religious attendance			
Never	1.6	5.3	<.01
Less than one time per month	.4	4.7	<.001
One to three times per month	2.1	3.5	.20
One time per week or more often	1.5	3.9	.03
Used a method of contraception at first intercourse			
Yes	1.1	3.8	<.001
No	1.9	7.0	<.001
Age at first intercourse (years)			
≤15	1.7	7.3	<.001
16–17	1.4	4.2	<.01
≥18	.8	1.0	.74

[a] "Some college" includes women with 2-year degrees.

were more likely to have used the IUD than never pregnant and nulliparous women at both time points. There was no significant increase in ever-use from 2002 to 2006–2010 among nulliparous women (.2% to .5%, $p = .19$).

Correlates of IUD use among sexually experienced young women in 2006–2010 are reported in Table 3. Compared with white non-Hispanic women, black non-Hispanic women were significantly less likely to report ever-use of the IUD (adjusted OR .32, 95% CI .16–.66). Hispanic women did not have significantly increased odds of having ever used the IUD (adjusted OR 1.26, 95% CI .66–2.41). There was a trend toward increased odds of ever having used an IUD among young women with Medicaid insurance or other government insurance versus no insurance (adjusted OR 1.80, 95% CI .94–3.43; $p = .08$), but not for privately insured women. Ever-use of the IUD was most strongly associated with parity. Compared with nulliparous young women, those with two or more prior deliveries had 13.60 times increased odds of having used an IUD (95% CI 4–46.48). Odds of having used an IUD were elevated among women reporting a prior teen pregnancy, but reached only borderline statistical significance (adjusted OR 2.49, 95% CI .91–6.84; $p = .08$).

Discussion

Ever-use of the IUD has increased significantly among sexually experienced adolescent and young adult women from 2002 to 2010, but remains low at under 5%. The increase in use holds true for almost all subcategories of women we analyzed. This finding is consistent with similar analyses of the 2006–2010 NSFG that included female respondents of all ages [20,21]. Despite gains in IUD use across all racial/ethnic groups of young women between the 2002 and 2006–2010 NSFG, the most recent data indicate that black non-Hispanic women are significantly less likely to have ever used an IUD compared with their white counterparts. Prior analyses of the NSFG, including our own of young women in the 2002 survey, have not observed this association [21,23]. An analysis of another nationally representative survey of women at risk of unintended pregnancy noted a relationship between black race and use of long-acting contraception, but the authors included injectables, the patch, and the ring in this method category [25]. In an updated analysis by the same group including data from the 2006–2008 NSFG, they report that African-American women were significantly more likely to use injectables than the IUD [22]. A recent analysis of the California PACT program found that black women were significantly less likely to receive an IUD (OR .5, 95% CI .4–.5) [26]. Given that this program provides access to all contraceptive methods at no cost, the authors' findings suggest that there are racial differences in IUD use that are independent of socioeconomic status and healthcare access. These differences may reflect variations in IUD knowledge: a national survey of young adult women aged 18–29 years also found significantly lower "IUD knowledge" among black women [19], and a survey including adolescent and young adult women reported lower awareness of the IUD among black women [27]. In our analysis of the 2002 NSFG, young Hispanic women were significantly more likely to have ever used an IUD than their white peers (adjusted OR 5.46, 95% CI 2.59–11.53) [23]. However, in the current analysis, although young Hispanic women continue to represent the highest proportion of ever-users, differences between Hispanic and non-Hispanic white women were no longer significantly different.

In addition to the changes we found in IUD use, we also found indicators of declining economic status for adolescents and young adult women, with more living at or near the poverty level and fewer having any or private insurance. These shifts are consistent with the economic downturn in the United States during this time period. Real median income for all households declined 6.7% between 2007 and 2009, and many fewer women aged 15–24 years reported any earnings in 2010 compared with 2002 [28]. Young women at the highest income level were significantly less likely to have ever used an IUD, and this was the only income category that did not show a significant increase in use between 2002 and 2006–2010. This category had the smallest number of IUD users (n = 8), so these findings should be interpreted with caution. Of note, this association has not been reported in similar NSFG analyses including women of all ages [20,21]. At the same time, women whose mother had attained a high school degree or above—another indicator of higher socioeconomic status—were more likely to have ever used the IUD. Higher maternal education has been linked to greater IUD awareness in a survey study of adolescent and young adult women [29].

The government plays an important role in providing health care to low-income women, both through government-sponsored insurance plans and programs such as the Title X family planning program. Although our analysis suggests a trend that government-sponsored insurance plans, including Medicaid, may impact IUD use, this association was not seen in

Table 3
Correlates of ever-use of the intrauterine device among adolescent and young adult women in the 2006–2010 National Survey of Family Growth

	Adjusted[a] OR (95% CI)	*p*
Age (years)		
15–19 [referent]	1	
20–24	1.64 (.96–2.80)	.07
Race		
White, non-Hispanic [referent]	1	
Black, non-Hispanic	.32 (.16–.66)	<.01
Hispanic	1.26 (.66–2.41)	.48
Other/Multiracial	.42 (.15–1.14)	.09
Maternal education		
Less than high school degree [referent]	1	
High school degree or higher	2.56 (1.22–5.43)	.01
Income as percent of poverty level, n (%)		
<100% [referent]	1	
100%–199%	.89 (.50–1.60)	.70
200%–299%	.84 (.39–1.80)	.64
≥300%	.23 (.07–.69)	.01
Insurance coverage		
No insurance [referent]	1	
Medicaid and other government-sponsored	1.80 (.94–3.43)	.08
Private	1.21 (.53–2.76)	.65
Ever had teen pregnancy		
No [referent]	1	
Yes	2.49 (.91–6.84)	.08
Parity		
0 [referent]	1	
1	11.43 (3.61–36.16)	<.001
2 or more	13.60 (4.00–46.48)	<.001
Age at first sexual intercourse		
≤15 years old [referent]	1	
16–17 years old	.65 (.40–1.08)	.09
≥18 years old	.36 (.15–.84)	.02

CI = confidence interval; OR = odds ratio.
[a] Odds ratios are mutually adjusted for all variables shown in the table.

a national survey of young adult women aged 18–29 years, nor in an NSFG analysis including women of all ages [19,21]. Additionally, we found that women with private insurance plans, which have wide variability in terms of coverage and co-payments for IUDs, were no more likely to use the IUD than those with no insurance. Recent research suggests that out-of-pocket cost, rather than insurance coverage per se, impacts whether an adolescent will adopt a LARC method [30]. Government-sponsored plans and programs generally cover the cost of LARC methods, but there are often barriers to access even when contraceptives are covered at no cost, including lack of access to trained clinicians and requirements for additional visits. Interventions that reduce out-of-pocket cost and increase immediate access to LARC methods have demonstrated success in increasing use of these methods among adolescents and young adult women [30,31]. Mandated contraceptive coverage with no co-pay as part of the Patient Protection and Affordable Care Act will likely further increase IUD use in this population by removing cost as a barrier for insured women and by increasing the number of women who qualify for Medicaid.

One notable group of young women who did not experience an increase in IUD use is nulliparous women. Ever-use of the IUD remains at <1% for these women, and this was one of the few subgroups for whom there was no significant increase from 2002 to 2006–2010. Recent NSFG analyses including women of all ages [20–22] found similar results, as did our analysis of young women in the 2002 NSFG [23]. We hypothesize that provider influence continues to play a large role in lagging rates of IUD use among nulliparous women, many of whom are at high risk of unintended pregnancy and in need of highly effective contraception. Older surveys and analyses of IUD providers have found misconceptions and restrictions concerning young and nulliparous women [32,33]. Despite growing evidence that IUD provision is safe and recommended in this population [13,14,34,35], many of these beliefs persist. In a survey of 1,978 office-based and Title X providers in the United States conducted from 2009–2010, 30% had misconceptions about the safety of IUDs for nulliparous women, and over 60% reported infrequent (never or rare) provision of IUDs to these patients [36]. A 2011 survey of family medicine physicians found that only 27% would recommend an IUD to a sexually active 16-year-old and only 50% to a nulliparous 21-year-old [37]. Very young women (age 17 years and younger) also did not experience an increase in use. This may also reflect provider influence. A recent survey of the staff of public high school-based health centers in New York City found that, despite high levels of knowledge about IUDs and their safety, only 55% would be likely to recommend an IUD to a patient under the age of 20 years and only 58% would recommend one to a nulligravid patient. That survey also found discrepancies between a provider's beliefs about the IUD and their likelihood to recommend it, in that 18% of those who knew that IUDs are safe for teens reported that they would be unlikely to recommend an IUD to a teen [38]. These findings suggest that educational interventions targeting health providers about the safety of IUDs for young and nulliparous women may play an important role in increasing access to IUDs for this population.

It appears that provider bias may be lessening in regard to marital status and IUD use. We found a greater than 10-fold increase in single women using the IUD from 2002 to 2006–2010, and unlike our 2002 analysis [23], relationship status was no longer significantly associated with ever-use of the IUD. In our prior analysis, we also found that history of having had a teen pregnancy was significantly associated with use of depot medroxyprogesterone acetate (DMPA) but not of the IUD and hypothesized that after pregnancy, teens were being steered toward use of DMPA but not toward the IUD [23]. However, in this analysis, there is a trend toward association between a history of teen pregnancy and ever-use of the IUD, which may indicate more willingness to recommend IUD use to teens after pregnancy.

Our study has several limitations. First, as the NSFG is a cross-sectional survey, the associations we identified cannot lead to the inference of causation. Our outcome variable included both current and former IUD users, who may differ from each other in significant ways. In addition, although use is increasing, there were relatively few IUD ever-users (n = 148) in our 2006–2010 analysis sample, which may have limited our ability to find statistically significant associations and our ability to consider confounding factors. We were unable to analyze the contraceptive implant, another long-acting method, due to the small number of women in this age group reporting ever-use of the method (n = 28).

The NSFG is the largest nationally representative survey with which to study contraceptive use in detail, and this analysis provides important information about the characteristics of adolescent and young adult women who use the IUD in the United States. Our data has identified trends in IUD use among young women from 2002 to 2010 and identified groups of young women, most importantly nulliparous women, who are unlikely to use the IUD. The findings from this analysis can be used to inform interventions to increase IUD use among this population.

Acknowledgments

An earlier version of this analysis was presented as a poster at the 2011 North American Forum on Family Planning.

Financial support/conflicts of interest: None.

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