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# Utilization of Infertility Treatments: the Effects of Insurance Mandates

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# Utilization of Infertility Treatments: The Effects of Insurance Mandates


## Abstract

Over the last several decades, both delay of childbearing and fertility problems have become increasingly common among women in developed countries. At the same time, technological changes have made many more options available to individuals experiencing fertility problems. However, these technologies are expensive, and only 25% of health care plans in the United States cover infertility treatment. As a result of these high costs, legislation has been passed in 15 states that mandates insurance coverage of infertility treatment in private insurance plans. In this paper, we examine whether mandated insurance coverage for infertility treatment affects utilization for a specific subgroup in the population: older, highly educated women. These women are both at high risk for fertility problems, and have high rates of coverage by insurance plans affected by the mandates. We find robust evidence that while an effect of the mandates on utilization can not be found for the full population of women, the mandates do have a large and significant effect on utilization for exactly this subgroup.

## I. Introduction

Over the last several decades, delay of childbearing among women in developed countries has become increasingly common. At the same time, the number of women experiencing fertility problems has also increased. In 2002, fertility problems affected 7.9 million women in the United States, and the rate of such problems among women 15–44 had increased 44% since 1982 (Chandra and Stephen, 2005). At the same time, technological changes have made many more options available to individuals experiencing fertility problems. These advancements have enabled many women to conceive and deliver their own biological children. However, these technologies are expensive, and only 25% of health care plans in the United States cover infertility treatment (William M. Mercer, 1997).

As a result of these high costs, legislation has been introduced at both the federal and state levels that would mandate insurance coverage of infertility treatment by private insurers. As of 2007, fifteen states have enacted some form of infertility insurance mandate, and additional states have ongoing legislative advocacy efforts in this area. The rhetoric surrounding passage of the mandates often focuses on expanding access to those who would not be able to afford treatment otherwise.[1] Given the continued interest in these types of mandates by policy-makers, understanding whether these mandates have an effect, and if so, for whom, is critical.

In general, the literature has found few effects of health insurance mandates on utilization of health services.[2] One possible explanation for the lack of findings is that state-level mandated benefits may not reach all individuals within a state. In general, health insurance mandates only

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[1] For example, RESOLVE, the national infertility organization, says on their website "RESOLVE endorses state and federal legislation that will require insurers to cover the costs of appropriate medical treatment. RESOLVE believes the option to pursue medical treatment for infertility must be available to all those who need treatment, not solely those with the resources to pay for the treatment out of pocket" (www.resolve.org). In an article about the passage of the New Jersey mandate in 2001, State Senator Diane B. Allen, a sponsor of the bill was quoted as saying "[C]ouples who are infertile and can't afford these things on their own have been treated extremely unfairly" (*New York Times*, 2001).

[2] See, for example, the literature on mental health mandates (Bao and Sturm, 2004; Pacula and Sturm, 2000).

apply to private insurance plans, and thus should directly influence only individuals who have private insurance.[3] Furthermore, many mandates should only affect a portion of the population, namely those who have the specific condition covered by the mandate. Thus, changes in utilization may be hard to detect in the full population, particularly if many of those with the condition in question are not privately insured at high rates.

In this paper, we examine whether infertility insurance mandates affect utilization for a specific subgroup in the population: those women who are both at high risk for fertility problems and have high rates of coverage by insurance plans to which the mandates apply. We find robust evidence that the mandates have a large and significant effect on utilization for exactly this subgroup.

## II. Infertility Treatment

Today, treatment for infertility tends to follow a hierarchical progression. The first stage of treatment is a diagnostic workup, involving a thorough examination of each partner's reproductive organs and their circulatory, endocrine, and necrologic functions. Couples who initiate treatment begin at Level I, which involves initial ovarian stimulation with clomiphene citrate for up to 6 cycles (taking at least 6 months). Level II involves the use of exogenous gonadotrophins (another drug used to stimulate ovulation), with or without intrauterine insemination (IUI), for up to 6 cycles, and Level III involves assisted reproductive technologies such as IVF, for up to 4 or more cycles. Of couples who begin treatment, over 80% of those who

[3] In addition, the Employment Retirement Income Security Act of 1974 (ERISA) preempts specific state regulation of self-funded insurance plans provided by private-sector employers, so mandated benefits do not directly affect individuals in firms that self-insure. Thus, it is possible that legislation may not affect enough individuals to discern an impact if looking at the entire population. For example, Liu et al. (2004) find that the effect of drive-through delivery laws has been blunted by ERISA.

proceed through all the steps are likely to conceive (Gleicher, 2000). Even for couples who are successful with their first cycle of IVF, the process can take 2–3 years.

Infertility services can be quite expensive and are not covered by many insurance plans. Hormone therapy can range from $200–$3,000 per cycle. Tubal surgery can range from $10,000–$15,000, requires a hospital stay, and poses a high risk of complication (RESOLVE, 2003). The average cost of an IVF cycle in the United States is $12,400 (ASRM, 2003), and Neumann, Gharib, and Weinstein (1994) calculate that the cost of a successful delivery through IVF ranged from $44,000 to $211,940 in 1992 dollars, depending on the cause of infertility, the mother's age, and other factors.

As a result of these high costs, one way in which access to infertility treatments has been expanded in the United States is through legislative action. The first state-level infertility insurance mandate was enacted by West Virginia in 1977. Since that time, fourteen other states have passed mandates, and additional states have ongoing legislative advocacy efforts in this area. Table 1 contains a list of states that have passed mandates, along with the year the mandate passed, and shows that there is considerable variation in both the timing of the mandates and in the types of states that have passed mandates; with the list including both small and large states, as well as states from all U.S. regions. Some mandates are mandates "to cover," and require that health insurance companies provide coverage of infertility treatment as a benefit included in every policy. Other states have enacted mandates "to offer," and require only that health insurance companies make available for purchase policies that cover infertility treatment. Finally, some mandates exclude coverage of IVF.[4] While only fifteen states have mandates in place during our sample period, these mandates were enacted in a number of large states and

[4] For additional detail on the mandates, see Schmidt (2005).

therefore affect an increasingly large fraction of the population. In 1981, less than one percent of the population resided in a state affected by the mandates, compared to 47.2% in 2003.

Previous research has considered the fertility and health impacts of these insurance mandates. Papers find that the mandates have increased birth rates among older women (e.g., Buckles, 2006; Schmidt, 2007) and have increased the share of births that are multiple births as well as the multiple birth rate (Buckles, 2006; Bitler, 2007; Bundorf et al., 2007). However, the estimated impacts of the mandates on utilization of services have been mixed. Previous work (Bitler and Schmidt, 2006) shows no effect of these mandates on utilization of infertility services for the overall population of women aged 15–44, or for a subgroup of college-educated women. Other work has focused on a single measure of utilization — cycles of *in vitro* fertilization (IVF) or other advanced fertility treatments (e.g., Jain et al., 2002; Hamilton and McManus, 2004; Bundorf et al., 2007; Henne and Bundorf, 2008; Bundorf et al., 2008). These papers are restricted to looking at use of IVF and other advanced treatments because of the data they use, a combination of Congressionally mandated clinic reports of success rates for cycles of IVF and other treatments which involve combining eggs and sperm outside the body and reports of such treatments collected by a provider group, the ASRM. Combined, these data only extend back to 1987 or so, a period after many of the mandates have been put in place. Due to these data limitations, these papers cannot use pre-mandate data on utilization and therefore cannot control for unobserved differences in utilization across regions that may be correlated with but not caused by the mandates. In addition, they must limit their analyses to assisted reproductive technologies such as IVF, which comprise only 5% of all infertility treatments (ASRM, 2003).

In this paper, we use the National Survey of Family Growth to examine utilization effects in a particular subgroup where we may be likely to detect an impact — highly educated older women. There are two reasons to expect effects for older, highly educated women. The first is related to demand for treatment. In order to desire treatment for infertility, one has to seek to become pregnant. Over the last several decades, increases in female labor force participation and educational attainment have been accompanied by delays in childbearing.[5] The average age at first birth has risen from 21 years in 1970 to 25 in 2000 (Mathews and Hamilton, 2002), and differences in age at first birth by educational category have been even more striking. College-educated women are more likely to delay, perhaps in part to reduce the motherhood wage penalty associated with childbearing (e.g., Blackburn et al., 1993; Miller, 2005). As women wait longer before attempting to have children, the age at which women's fertility problems are first discovered will rise.

In addition, age is associated with difficulty conceiving and carrying a pregnancy to term (Weinstein et al. 1990). Older women are significantly more likely to experience fertility problems and to seek help for these problems (Stephen and Chandra, 2000; Wright, Schieve, Reynolds, and Jeng, 2003). In 2002, women 30 and older accounted for almost 89% of all assisted reproductive technology procedures (e.g., IVF) performed in the United States.

The second reason to expect any effects to be concentrated among older, highly educated women is that these state-level mandates generally only legally apply to persons with private health insurance.[6] Older, highly educated women are more likely to have private coverage (either through their own employer or through a spouse's employer or through an individual plan) than are other women. During calendar year 2002, 85% of women 30 and older with some

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[5] These delays in childbearing depend upon the ability of women to effectively control their fertility through contraception and or abortion (e.g. Goldin and Katz, 2002; Bailey, 2006; Guldi, 2007).

[6] However, since ERISA exempts self-insured plans, having private insurance is a necessary but not sufficient condition for having a mandate affect coverage of infertility treatment.

college were covered by a private health insurance plan, while only 64% of women with at most a high school degree had such coverage.[7, 8]

## III. Methodology and Data

We pool individual-level data from the 1982, 1988, 1995, and 2002 rounds of the NSFG to see whether utilization of infertility treatment is heavier in states with infertility insurance mandates. Each wave of the NSFG surveys a nationally representative sample of women aged 15–44 on their fertility and marital histories. The NSFG is the only source of data on use of infertility treatment that covers the previous few decades. We merge information on state infertility insurance mandates to the NSFG data.

Our first key variable of interest is an indicator for whether the woman has ever received any medical help to get pregnant.[9] We then decompose this variable by *type* of treatment. The "any medical help" category includes some therapies that are almost exclusively used for infertility treatment — ovulation-inducing drugs, artificial insemination, and IVF; but it also includes other medical procedures that might plausibly have been covered without mandates (these include testing of the respondent or her partner, surgery for blocked tubes, treatment for endometriosis or fibroids, advice, and an "other" category). We expect the mandates to increase use of ovulation-inducing drugs, artificial insemination, and IVF more than they increase use of the other therapies. Finally, if there are utilization responses that are clearly due to the mandates,

[7] These numbers are derived from authors' tabulations from the 2003 March Current Population Survey.

[8] This same group of women is also likely to have higher levels of income with which they could presumably pay for infertility treatments out of pocket. However, the median family income for white women with at least some college education in 2001 was approximately $58,000, which likely would not easily enable a family to pay for infertility treatments out-of-pocket, given estimates that suggest that the median cost per live delivery resulting from IVF is $56,419 (Collins, 2001).

[9] Women are coded in the NSFG as having ever obtained infertility treatment if they reported either having obtained medical help to get pregnant or having obtained medical help to avoid a miscarriage (or both). Earlier work (Bitler and Schmidt, 2006) analyzes the aggregate variable, but here we look at the components, since we expect insurance mandates to affect the two variables differently.

we would expect them to affect use of medical help to get pregnant more than use of medical help to prevent miscarriage (which was likely to be covered in the absence of a mandate).[10]

Table 2 contains summary statistics for our treatment variables for all women, as well as broken out by age group (under 30 versus 30 and older) and completed education (no college versus at least some college). While about 10% of women 15–44 have ever obtained medical help to get pregnant, this varies dramatically by age. Older women are about three times as likely as women under 30 to have received medical help to try to get pregnant (14% versus 4.8%). There is also evidence that the type of treatment varies by age, as older women are about four times as likely as younger women to have been treated with ovulation-inducing drugs (5.4% of women 30 and older versus 1.4% of younger women). Older women are about twice as likely as younger women to report having obtained medical help to prevent miscarriage.

These differences by age are even starker in recent data. In the 2002 NSFG, for women 30 and older who had an infertility visit, 73% sought help to get pregnant as opposed to only seeking medical treatment to prevent a miscarriage (compared to 56% of women under 30 who had an infertility visit), 34% ever were given ovulation-inducing drugs (compared to 22% of women under 30), and fully 11% ever had artificial insemination or in vitro fertilization (as compared to 4% of women under 30). These statistics suggests that the older women are disproportionately obtaining more expensive services.[11]

Table 2 also shows that use of treatment varies by education level (some college versus no college), although the differences by education group are less striking than the differences by

[10] Strictly speaking, none of these are pure "placebo" tests. One might expect visits to prevent miscarriage to increase after use of treatment, which could increase with mandates. Similarly, use of the other therapies described above might all increase with mandates, although we would expect any such increase to be smaller than the increase in use of treatments such as ovulation-inducing drugs or artificial insemination, which are both expensive and almost exclusively used for infertility treatment.

[11] In addition, of the women aged 30–44 who reported ever having received treatment to get pregnant in the 2002 NSFG, 75% reported that private health insurance paid for that treatment. However, we cannot analyze this variable in our empirical analysis since the question was not asked in all waves of the NSFG.

age. The largest difference is for use of ovulation-inducing drugs, artificial insemination, or IVF. Women with some college are 1.8 times as likely as women with no college to have ever used such services (4.8% of women with some college versus 2.6% of women with no college).

Next we turn from the simple means to multivariate regressions. Our empirical specification is as follows:

$$\begin{aligned}
&treatment_{ist} = \beta_1 mandate_{st} + \beta_2 (age30+)_{ist} + \beta_3 somecoll_{ist} \\
&+\beta_4 (mandate_{st} \times age30+_{ist}) + \beta_5 (mandate_{st} \times somecoll_{ist}) \\
&+\beta_6 (age30+_{ist} \times somecoll_{ist}) + \beta_7 (mandate_{st} \times age30+_{ist} \times somecoll_{ist}) \\
&+X_{ist}\delta + Z_{st}\alpha + \gamma_s + \nu_t + \varepsilon_{ist}
\end{aligned}$$

*Treatment* represents the treatment categories reported by NSFG respondents and described earlier. We first look at whether a woman reports ever having any medical help to get pregnant. We then divide that category into two groups — those women who report ever using ovulation-inducing drugs, artificial insemination, or IVF; and those women who report using other types of medical help to get pregnant.

We control for a number of individual-level characteristics, including age, race, ethnicity, educational attainment, and whether or not the woman lives in an urban area. The Z vector includes a number of time-varying state-level characteristics, such as the share of the population that is black and the share Hispanic, the Medicaid eligibility threshold for a pregnant woman, the real maximum AFDC/TANF benefit for a family of four, real median income for a family of four, the unemployment rate, the employment growth rate, the share of the population under the Federal Poverty Level, and the share of births to unmarried women. These state-level controls have been found to be associated with fertility behavior in other work.

For the reasons outlined above, we expect that the mandates will have the largest impact on older, college educated women, since they are the group at higher risk for fertility problems, and the group most likely to have private health insurance.[12] Thus, our key estimated effect, $\beta_7$, is on the three-way interaction between the woman's state having an infertility insurance mandate, the woman's age being at least 30, and the woman having attained at least some college. We also control separately for mandate, age, and education effects, and all two-way interactions between mandate, age, and education. Our regressions include both state and year fixed effects. If the effects of the mandates on other groups were negligible, this would represent a differences-in-differences-in-differences estimate. To the extent that the mandates have positive effects on women in other groups, it suggests that the impacts we see for all women may be an underestimate of the effects on the older, highly educated women.

We weight the data to be population-representative, and we report heteroskedasticity robust standard errors clustered at the state level.[13] We estimate these regressions on the sample of women who have had sex and are past menarche. We estimate linear probability models, but results from logistic regressions are presented in Appendix Table 1 (odds ratios) and 2 (marginal effects).[14]

One potential issue with the outcome measures used here relates to the distinction between stocks and flows. Conceptually, we would like to measure the effect of the mandates on the likelihood that a woman utilizes infertility treatment in a given year. However, the measures

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[12] We cannot observe private insurance coverage in all waves of our data and likely would not want to use it as a control in any case, as it could conceivably respond to the mandates.

[13] The NSFG is a complex sample survey. While all waves we use of the NSFG were designed to provide data that was nationally representative of the US female population 15–44, there have been numerous changes in sample design over time. In particular, different surveys oversampled different groups (e.g., black women in all NSFG waves, but Hispanic women in only 1995 and 2002, and teen women in only 1982). As a result, we use the population weights provided by the NSFG to ensure the data are comparable across years.

[14] Since the model presented in the Appendix tables is nonlinear and our variables of interest are interactions, we focus on the marginal effects for our key variables, because coefficients on interaction effects in nonlinear models are not equal to the marginal effects of the interaction terms. As Ai and Norton (2003) point out, the magnitude of the marginal effects of the interaction depends on the value of the covariates in the model across the full sample and could even be of a different sign than the coefficient on the interaction term. The marginal effects are the averages over the full samples, using each observation's Xs (except those for the key coefficients) set to their actual values, with standard errors calculated via the delta method.

we are using examine whether the respondent has ever received infertility treatment, and therefore measures the stock of women who have received treatment. Even if mandates affect the number of women who receive treatment in a given year, the stock of women who have ever received treatment may be changing so slowly that it is difficult to estimate effects.

## IV. Results

Our key results are reported in Tables 3 through 5. Table 3 reports the OLS regression results for utilization of different types of treatments as a function of state-mandated infertility insurance. Column 1 presents results for whether the woman reported seeking any medical help to get pregnant. These results show that the mandate itself has no statistically significant effect on reports of seeking medical help. However, the coefficient for the three-way interaction of mandate, age at least 30, and education at least some college (in bold) is a positive 0.041, and is statistically significant at the 5% level. This suggests that for highly educated older women, living in a mandate state is associated with a 4.1 percentage point increase in the probability of ever having had sought medical help to get pregnant. The magnitude of this effect is large, given the pre-reform mean of around 10% percent of women who ever sought such help, but this is not so surprising given the high cost of many of these treatments. This finding suggests two things: first, that the mandates have an economically significant effect on utilization of infertility services; and second, that even mandates that have a large effect on a particular subgroup may have no discernable impact on the entire population.

Some of the two-way mandate interactions are also significant (and negative), which may be surprising, given that the mandate should lower costs for anyone affected by the mandate. However, these negative effects are smaller in magnitude than the 3-way interaction, and not uniform in their pattern of significance across specifications with different dependent variables. In Columns 2 and 3, we split our dependent variable into two categories: those women who report ever using ovulation-inducing drugs, artificial insemination, or IVF; and those women who report using other types of medical help to get pregnant. The estimated coefficients for $\beta_7$, our key variable of interest, are not statistically different across these two specifications – in each case suggesting an effect of the mandates on the utilization of services among older college-educated women of approximately 2 percentage points. However, the effect of mandates on use of ovulation-inducing drugs, artificial insemination, or IVF for older, educated women is considerably larger as a share of pre-mandate use than the effect on use of other therapies. Before the laws were passed, only 3.6 percent of women used IVF, artificial insemination, or ovulation-inducing drugs while 6.8 percent used other therapies (numbers not reported in tables). Thus, a 2 percentage point increase in use of ovulation-inducing drugs, artificial insemination, or IVF with mandates reflects a 56% increase from a baseline level of use of 3.6 percent of women compared to a 29% increase in the use of other therapies from a baseline level of use of 6.8 percent of women.

Finally, in Column 4, we use an alternative dependent variable of whether a woman sought any medical help to avoid miscarriage. This variable should respond only indirectly to the mandates (e.g., if women who use infertility treatment conceive but are more likely to miscarry), so we expect the effect of infertility insurance mandates on this variable to be much smaller in magnitude. As expected, the coefficient on the three-way interaction between the mandate, age, and education is much smaller in magnitude at 0.009, and is not statistically different from zero.

All of our dependent variables are binary indicators, and some of their averages are small. One might be concerned about the use of least squares in this setting. We have verified that these results are robust to functional form by estimating the corresponding logistic regressions. The estimated odds ratios can be found in Appendix Table 1, and the estimated marginal effects in Appendix Table 2. Note that the estimated three-way marginal effects reported in Appendix Table 2 are quite similar to the least squares ones reported in Table 3. For example, the marginal effect on the interaction of mandate, age at least 30, and some college in column 1 is 0.045 as compared to the OLS marginal effect of 0.041.

As described above, the mandates differ along several dimensions. First, some mandates require that infertility treatments be covered, while others only require that coverage be offered. In Panel A of Table 4, we break out cover mandates from offer mandates. Column 1, again looking at the broad indicator of whether a woman received any medical help to get pregnant, shows similar effects of cover and offer mandates on utilization of services. However, these effects are quite different when we examine the more detailed breakdown of treatments by type. Cover mandates have a much larger effect on the more expensive treatments of ovulation-inducing drugs, artificial insemination, and IVF than do the offer mandates, while the reverse is true for the other types of medical help to get pregnant. In Panel B, we break out mandates that include IVF from those that do not, and find that it is the mandates that include IVF that have the largest effect on utilization of all types of services.

One concern with the results presented above is that the mandates could be correlated with broader trends in fertility, and that our estimated mandate effects could therefore be picking up these broader trends. The results presented above that suggest that the mandates have a greater effect on the types of treatment where we would expect them to have a greater effect, and that help to prevent miscarriage is largely unaffected by the mandates. Both of these findings lend us confidence in our interpretation of the results. In Table 5, we examine whether the mandates are correlated with three other fertility variables that should not be directly affected by enactment of these laws — the number of abortions reported by a woman, the number of pregnancy losses, and whether or not the woman is currently pregnant.[15] As shown by Table 5, none of these variables is statistically significantly associated with passage of the mandates for the older, more educated women. Lastly, we have tested to see whether our results are driven by endogeneity of the passage of mandates by including leads of the mandate variables in our specifications; these leads are not statistically significant.

## V. Discussion and Conclusion

Evidence concerning the effect of various health insurance mandates suggests many such mandates have little impact on health care utilization. In this paper, we pool data from waves of the National Survey of Family Growth to see whether mandates for infertility treatment affect use of infertility treatment among women 15–44. Our results suggest that state-level mandates related to coverage of infertility treatment are associated with an economically and statistically significant increase in utilization of services. However, these effects are only present among a subgroup of older, more-educated women and are not visible when examining the entire population of child-bearing women. One implication of our findings is that subgroup analysis is likely to be important when analyzing the utilization and health impacts of various health insurance mandates. This is particularly true given that most health insurance mandates only

[15] Clearly abortions should not respond to the mandates directly. Miscarriages may respond indirectly if, after mandates are adopted, women obtain more treatment which leads to conceptions that may end in miscarriage. However, there should be a longer lag in resulting miscarriages than in use of treatments, and these indirect effects are likely to be relatively small. Similarly, current pregnancies might respond with a lag, but these indirect effects are also likely to be small.

apply to a relatively small share of private-sector employees. Our own estimates from 2003 MEPS data suggest that 14–19% of private sector employees enrolled in employer-provided insurance in the U.S. were in firms to which these infertility insurance mandates applied (AHRQ 2005).

Since mandates are enacted to affect utilization of services and, ultimately, health outcomes, understanding why certain mandates affect these variables is important for policy efficacy. One possible explanation for our findings of a utilization effect, when few of these effects have been found in the broader mandate literature, is that in the case of infertility treatment, those individuals who are most likely to demand services (women who are older and highly educated) are also most likely to be affected by the mandate due to their higher probability of having private health insurance. For many other mandates, these two populations may not be the same. In those cases, affecting health outcomes may require other policy interventions.

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**Table 1**
**State Mandated Infertility Insurance**

| State | Year Enacted | Mandate to Cover/Mandate to Offer | *In Vitro* Fertilization Coverage? |
|---|---|---|---|
| Arkansas | 1987[a] | Cover | Yes |
| California | 1989 | Offer | No |
| Connecticut | 1989 | Offer | Yes |
| Hawaii | 1987 | Cover | Yes |
| Illinois | 1991 | Cover | Yes |
| Louisiana | 2001 | Cover | No |
| Maryland | 1985 | Cover | Yes |
| Massachusetts | 1987 | Cover | Yes |
| Montana | 1987 | Cover | No |
| New Jersey | 2001 | Cover | Yes |
| New York | 1990[b] | Cover | No |
| Ohio | 1991[c] | Cover | Yes |
| Rhode Island | 1989 | Cover | Yes |
| Texas | 1987 | Offer | Yes |
| West Virginia | 1977[d] | Cover | No |

Source: Schmidt (2007).
[a] Some coverage for IVF was first required in 1987. The law was revised in 1991 to set maximum and minimum benefit levels and to establish standards for determining whether a policy or certificate must include coverage (see Appendix A of Schmidt, 2005).
[b] In 2002, New York passed a revised law that clarified the 1990 legislation and appropriated $10 million to a pilot project to help pay for IVF for a small number of individuals.
[c] The original 1991 law did not specifically exclude IVF, but in 1997 the Superintendent of Insurance stated that IVF, GIFT, and ZIFT were not essential for the protection of an individual's health and were therefore not subject to mandated insurance coverage. We code Ohio as an IVF state between through 1997.
[d] In 2001, the law was amended to mandate HMOs to cover infertility treatment only as a "preventative service" benefit (thus excluding IVF).

**Table 2** Summary statistics for ever having had various forms of infertility treatment, all women and by group, pooled NSFG data

| *Treatment* | All | Under 30 | 30 or older | No college | Some college |
|---|---|---|---|---|---|
| Medical help to try to get pregnant | 0.100 | 0.048 | 0.140 | 0.081 | 0.121 |
| Ovulation-inducing drugs, artificial insemination, or IVF | 0.036 | 0.014 | 0.054 | 0.026 | 0.048 |
| Other medical help to try to get pregnant | 0.063 | 0.034 | 0.086 | .0055 | 0.073 |
| Medical help to try to prevent miscarriage | 0.072 | 0.047 | 0.091 | 0.064 | 0.083 |

*Notes*: Shown are weighted averages among women who have ever had sex after menarche for various outcomes. The means are for the sample of women described in the column labels. The value in the first row is the share reporting having had medical help to try to get pregnant. The value in the second row is the share reporting having used ovulation-inducing drugs, artificial insemination, or IVF (a subset of those reporting medical help to try to get pregnant). The value in the third row is the share reporting having gotten some medical help to try to get pregnant but not ovulation-inducing drugs, artificial insemination, or IVF. The value in the fourth row is the share reporting ever having had medical help to try to prevent miscarriage. The value in the first column is the mean for all women, that in second column for women under 30, that in third column for women 30 and older, that in fourth column for women with no college attendance, and that in fifth column for women with some college. Data are from pooled 1982, 1988, 1995, and 2002 waves of the NSFG. Rounding for columns 1–3 is done independently, so the sum of rows 2 and 3 may not equal value in row 1.

**Table 3**
**Utilization of types of infertility treatment as a function of state-mandated infertility insurance, OLS results**

| | Any medical help to get pregnant | | Ovulation-inducing drugs, artificial insemination, or IVF | | Any *other* medical help to get pregnant | | Any medical help to avoid miscarriage | |
|---|---|---|---|---|---|---|---|---|
| White | 0.031 | | 0.018 | | 0.012 | | 0.013 | |
| | (0.004) | *** | (0.004) | *** | (0.003) | *** | (0.004) | *** |
| Any infertility mandate | 0.004 | | 0.0005 | | 0.003 | | 0.002 | |
| | (0.010) | | (0.005) | | (0.011) | | (0.008) | |
| Age 30+ | 0.072 | | 0.023 | | 0.048 | | 0.015 | |
| | (0.007) | *** | (0.003) | *** | (0.006) | *** | (0.006) | ** |
| At least some college | -0.0001 | | -0.002 | | 0.002 | | -0.011 | |
| | (0.005) | | (0.003) | | (0.004) | | (0.006) | ** |
| Any mandate x age 30+ | -0.027 | | -0.006 | | -0.021 | | -0.001 | |
| | (0.010) | ** | (0.006) | | (0.008) | ** | (0.010) | |
| Any mandate x at least some college | -0.015 | | -0.008 | | -0.008 | | -0.0003 | |
| | (0.007) | ** | (0.004) | * | (0.006) | | (0.010) | |
| Age 30+ x at least some college | 0.046 | | 0.028 | | 0.018 | | 0.043 | |
| | (0.011) | *** | (0.005) | *** | (0.010) | * | (0.009) | *** |
| **Mandate x age 30+ x at least some college** | **0.041** | | **0.021** | | **0.020** | | **0.009** | |
| | **(0.016)** | ** | **(0.010)** | ** | **(0.011)** | * | **(0.015)** | |
| Observations | 31,049 | | 31,049 | | 31,049 | | 28,926 | |
| Adjusted R-squared | 0.03 | | 0.02 | | 0.02 | | 0.03 | |

*Notes*: Shown are coefficients from OLS regressions of determinants of ever having had various types of infertility treatment. Each column presents results from one regression. Regressions are weighted, with standard errors clustered at the state level reported in parentheses, and also include state and year of interview fixed effects. Data are from pooled 1982, 1988, 1995, and 2002 waves of the NSFG. Sample is all women who have had sex post-menarche. ***, **, and * denote that the coefficient is significantly different from zero at the 1, 5, and 10 percent levels.

**Table 4**
**Utilization of types of infertility treatment as a function of state-mandated infertility insurance**
**By type of mandate**

| | Any medical help to get pregnant | | Ovulation-inducing drugs, artificial insemination, or IVF | | Any *other* medical help to get pregnant | | Any medical help to avoid miscarriage | |
|---|---|---|---|---|---|---|---|---|
| A. Cover versus Offer | | | | | | | | |
| Cover x age 30+ x at least some college | 0.040 | | 0.030 | | 0.009 | | 0.031 | |
| | (0.024) | | (0.016) | * | (0.013) | | (0.016) | * |
| Offer x age 30+ x at least some college | 0.043 | | 0.009 | | 0.033 | | -0.013 | |
| | (0.014) | *** | (0.009) | | (0.010) | *** | (0.010) | |
| B. IVF vs. Non-IVF | | | | | | | | |
| IVF x age 30+ x at least some college | 0.052 | | 0.026 | | 0.026 | | 0.019 | |
| | (0.015) | *** | (0.010) | ** | (0.012) | ** | (0.022) | |
| Non-IVF x age 30+ x at least some college | 0.028 | | 0.015 | | 0.013 | | -0.004 | |
| | (0.022) | | (0.017) | | (0.015) | | (0.018) | |

*Notes*: Shown are coefficients on interactions of age being at least 30, some college, and type of mandate from OLS regressions of determinants of ever having had various types of infertility treatment. Regressions in Panel A. control for whether mandate is to cover or to offer to cover infertility treatment. Regressions in Panel B. control for whether mandates excludes IVF or fails to exclude it. Other controls are the same as in Table 3. For other details, see notes for Table 3.

**Table 5**
**Robustness Tests**

| | Abortions | Number of pregnancy losses | Currently pregnant |
|---|---|---|---|
| Mandate x age 30+ x at least some college | -0.054 | 0.008 | -0.0007 |
| | (0.043) | (0.048) | (0.015) |
| Observations | 31,049 | 31,049 | 31,049 |

*Notes*: Shown are coefficients on interactions of age being at least 30, some college, and any infertility mandate from OLS regressions of determinants of outcomes in column head. Other controls are the same as in Table 3. For other details, see notes for Table 3.

**Appendix Table 1**
**Utilization of types of infertility treatment as a function of state-mandated infertility insurance**
**Odds ratios from logistic regressions**

| | Any medical help to get pregnant | | Ovulation-inducing drugs, artificial insemination, or IVF | | Any *other* medical help to get pregnant | | Any medical help to avoid miscarriage | |
|---|---|---|---|---|---|---|---|---|
| Any infertility mandate | 0.930 | | 1.033 | | 0.887 | | 1.150 | |
| | (0.159) | | (0.249) | | (0.231) | | (0.147) | |
| Age 30+ | 2.623 | | 2.741 | | 2.455 | | 1.326 | |
| | (0.216) | *** | (0.372) | *** | (0.258) | *** | (0.131) | *** |
| At least some college | 1.024 | | 0.992 | | 1.048 | | 0.749 | |
| | (0.096) | | (0.206) | | (0.108) | | (0.101) | ** |
| Any mandate x age 30+ | 0.850 | | 0.822 | | 0.865 | | 0.957 | |
| | (0.153) | | (0.219) | | (0.182) | | (0.149) | |
| Any mandate x at least some college | 0.692 | | 0.531 | | 0.796 | | 1.011 | |
| | (0.112) | ** | (0.150) | ** | (0.156) | | (0.216) | |
| Age 30+ x at least some college | 1.404 | | 1.638 | | 1.226 | | 2.013 | |
| | (0.169) | *** | (0.349) | ** | (0.180) | | (0.304) | *** |
| Mandate x age 30+ x at least some college | 1.948 | | 2.499 | | 1.626 | | 1.046 | |
| | (0.391) | *** | (0.796) | *** | (0.344) | ** | (0.251) | |
| | | | | | | | | |
| Observations | 31,047 | | 31,047 | | 31,047 | | 28,926 | |
| Pseudo R-squared | 0.06 | | 0.08 | | 0.05 | | 0.05 | |

*Notes*: Shown are odds ratios (standard errors) from logistic regressions of determinants of ever having had various types of medical help to try to get pregnant. Each column presents results from one regression. Regressions are weighted, with standard errors clustered at the state level, and also include state and year of interview fixed effects. Data are from pooled 1982, 1988, 1995, and 2002 waves of the NSFG. Sample is all women who have had sex post-menarche. ***, **, and * denote that the underlying logistic regression coefficient is significantly different from zero at the 1, 5, and 10 percent levels

**Appendix Table 2**
**Utilization of types of infertility treatment as a function of state-mandated infertility insurance**
**Marginal effects from logistic regressions**

| | Any medical help to get pregnant | | Ovulation-inducing drugs, artificial insemination, or IVF | | Any *other* medical help to get pregnant | | Any medical help to avoid miscarriage | |
|---|---|---|---|---|---|---|---|---|
| Any infertility mandate | -0.008 | | -0.0006 | | -0.008 | | 0.009 | |
| | (0.010) | | (0.006) | | (0.009) | | (0.011) | |
| Age 30+ | 0.091 | | 0.038 | | 0.053 | | 0.037 | |
| | (0.010) | *** | (0.006) | *** | (0.008) | *** | (0.008) | *** |
| At least some college | 0.028 | | 0.015 | | 0.014 | | 0.015 | |
| | (0.008) | | (0.005) | | (0.007) | | (0.008) | ** |
| Any mandate x age 30+ | 0.002 | | 0.004 | | -0.003 | | 0.003 | |
| | (0.012) | * | (0.007) | | (0.008) | | (0.012) | |
| Any mandate x at least some college | 0.011 | | 0.004 | | 0.006 | | 0.004 | |
| | (0.011) | ** | (0.008) | | (0.008) | | (0.010) | |
| Age 30+ x at least some college | 0.054 | | 0.029 | | 0.024 | | 0.046 | |
| | (0.011) | *** | (0.007) | *** | (0.009) | ** | (0.010) | *** |
| Mandate x age 30+ x at least some college | 0.045 | | 0.020 | | 0.023 | | 0.009 | |
| | (0.016) | *** | (0.011) | * | (0.010) | ** | (0.013) | |

*Notes*: Shown are the marginal effects (differences in predicted probabilities), with standard errors in parentheses, for various dummy variables from logistic regressions in Appendix Table 1. Each column presents results from one regression. Regressions are weighted, with standard errors clustered at the state level, and also include state and year of interview fixed effects. Data are from pooled 1982, 1988, 1995, and 2002 waves of the NSFG. Sample is all women who have had sex post-menarche. ***, **, and * denote that the delta method-calculated $p$-value is statistically significant at the 1, 5, and 10 percent levels. Marginal effects are averaged over all observations, with all $X$s evaluated at their actual values except that relevant dummy variables were set to 0 or 1.