



Published in final edited form as:

Stud Fam Plann. 2001 December ; 32(4): 329–338.

Changes in Contraceptive Use in Bulgaria, 1995-2000

Elwood Carlson and Vicki Lamb

Elwood Carlson is Head, Research Unit on Reproductive Health, Max Planck Institute for Demographic Research, Doberaner Strasse 114, D-18057 Rostock, Germany. E-mail: carlson@demogr.mpg.de. Vicki Lamb is Postdoctoral Fellow, Duke University Center for Demographic Studies, Durham, NC.

Abstract

Comparison of results from national surveys conducted in Bulgaria in 1995 and 2000 reveal little overall change in use of modern contraceptives. Dramatic increases occurred, however, among women younger than 25 who entered their reproductive period after the end of the state socialist period. This finding suggests that contraceptive gains in the country will come largely as a cohort-replacement process. From these data, no separate program impact appears for special clinics established to provide direct, subsidized delivery of modern contraceptives to women in selected cities. The special clinics opened in cities where contraceptive use was already above the national average. During these five years, other cities lacking special clinics managed to gain in prevalence of modern contraceptive use, leaving a relatively homogenous urban-rural difference in levels of use throughout the country.

At the start of the 1990s, Bulgaria exhibited the generic state socialist pattern of reproduction. Women married early and almost universally and quickly had a first child, but reproductive activity also came to an equally early end (Carlson and Bernstam 1991). Because the state socialist reproductive model created a long period of sexually active adult life after a brief early childbearing period, birth control became a highly salient concern.

Countries in eastern Europe legalized induced abortion after World War II, well before modern contraceptive methods became widely available (David 1970; Blayo 1991). Even after modern methods appeared, the region continued to experience a chronic lack of access (Thomas 1991) coupled with official discouragement of their use (Popov et al. 1993). Limited choice of fertility-control methods plus an early end to childbearing resulted in frequent recourse to induced abortion (Tietze 1964; Mazur 1975; Okolski 1983; Frejka 1985; Skjeldestad 1995). Abortion rates in this region exceeded those anywhere else in the world (Henshaw and Silverman 1990; Masarliev et al. 1990; David 1992). The age-parity profile of women terminating their pregnancies also differed from that found elsewhere, for example, in the United States (Henshaw and Silverman 1988). Rather than occurring chiefly among young, sexually inexperienced women, induced abortions characteristically involved older married women who already had one child or more (Blayo 1991; Thapa et al. 1992).

The 1990 Tblisi conference convened by the World Health Organization's Copenhagen office (WHO 1991) focused on former state socialist countries' heavy reliance on repeated induced abortions for fertility control that occurred despite the deleterious long-term impact of such repeated procedures (Beric et al. 1973; Patelakis et al. 1973; Levin et al. 1980; Berger et al. 1984; Rodriguez et al. 1995). After the Tblisi conference, political and scientific leaders within these countries began to work closely with regional and international agencies building new infrastructure for family planning, to widen the choice of contraceptive methods available to women.

Conditions in Transitional Bulgaria

A good example of this process took place in Bulgaria. Use of modern contraceptive methods had already been increasing in the country during the late state socialist period, but even as late as 1995, a significant proportion of women reported continued reliance on traditional contraceptive methods or no contraceptive practices at all (Carlson and Omori 1998). Because Bulgaria represented a highly motivated population of potential method users with an unmet need for contraceptive services (Dixon-Mueller and Germain 1992; Bongaarts and Bruce 1995; Klijzing 1999), several groups began expanding family planning clinics and services in the 1990s. Organizational actors included women's associations, the Ministry of Health, and a nongovernmental organization, the Bulgarian Family Planning Association (BFPA), with links to the international family planning movement. This combination of actors eventually led to the introduction of two separate efforts in Bulgaria, beginning at slightly different times and composed of decidedly different program strategies (David and Skilogianis 1999). Both programs have been coordinated and supervised by the Ministry of Health, which makes comparing and evaluating them in uniform terms possible.

One of these efforts involved the BFPA, in cooperation with the International Planned Parenthood Federation (IPPF). The other involved a coalition of several national women's organizations, operating without international funding or other support. The BFPA project also received support from the European Phare initiative for eastern European countries. As part of the proposal for Phare support, the BFPA project explicitly proposed that among its other goals, it would seek to have a demographic impact on reproductive behavior, increasing both knowledge and use of modern contraceptives to such an extent that there would be a measurable change in the relative numbers of births and abortions in the country within the five-year time frame of the proposed Phare project. Because this goal was announced explicitly for the program, assessing whether the goal was achieved is useful. This analysis makes a first step in the direction of evaluation, by examining the impact of the project in terms of modern contraceptive use. Unfortunately, serious problems with the system of abortion registration in the country preclude direct evaluation of the ultimate effects of the project on abortion and birth rates at this time, although efforts to remedy this situation continue. Women were asked questions about abortions in the national surveys described below, but as is usual in such survey data, comparison of respondents' self-reports with totals of births and abortions registered by the vital statistics system of the country demonstrates that between one-third and one-half of all abortions were not reported by survey respondents. Therefore, these surveys cannot be used directly to study abortion trends. Further complicating the assessment of reproductive outcomes, the Bulgarian system of vital statistics registration maintains no computerized database of abortions, publishing only a few summary statistics each year, so that multivariate analysis of trends in induced abortion is virtually impossible to conduct using official statistics.

The geographic unit of analysis used here to document possible effects of BFPA clinic efforts is the region, of which Bulgaria has 28 including the national capital of Grad Sofia (within but separate from the Sofiaska region). Sofia must be considered separately in all analyses because conditions there differ so greatly from the rest of the country. Within each region, populations of the capital cities where BFPA clinics were opened are distinguished from those of other towns and villages. Figure 1 shows the regions of the country with BFPA clinic areas highlighted.

The first BFPA demonstration clinic opened in Sofia in January of 1993, followed by clinics in Gabrovo, Plovdiv, and Stara Zagora later in 1993. In 1994, BFPA clinics opened in Pleven, Sevlievo in Gabrovo region, and Veliko Turnovo. A second clinic in Pleven region opened in 1995. In late 1996, the final BFPA clinics opened in Haskovo, Rousse, and Varna. Each clinic was staffed by medical personnel (including an obstetrician/gynecologist) with special training

in family planning. Staff conducted medical examinations and prescribed and dispensed contraceptives directly on site. Contraceptives were supplied through IPPF channels and offered to clients at subsidized prices (approximately 10 percent of world market prices). BFPA clinics performed no abortions. Induced abortions continued to be performed in hospitals and polyclinics by obstetrician/gynecologists, just as they had been before the family planning program began. No effort was made to suppress induced abortion, only to offer new programmatic alternatives to women.

In the remainder of the country's regions (excluding Sofia), information centers were opened by one or more of several national women's organizations invited by the Ministry of Health to cooperate in provision of these services. These centers, staffed by members of the women's movements, did not include medical staff, so they could not prescribe or dispense contraceptives other than condoms. They counseled clients and provided referrals to obstetrician/gynecologists for contraceptive provision. The client had to visit the center, receive a referral to an obstetrician/gynecologist, visit the physician to receive a prescription, and find a regular polyclinic that stocked the contraceptive and participated in the price-subsidy program. The route to obtaining contraceptives in this manner was circuitous and fraught with difficulties.

The medical profession in Bulgaria, and obstetric/gynecological specialists in particular, absorbed lessons from the state-mandated medical curriculum during several decades when official government policies discouraged contraception. As a result, many of these doctors, like their counterparts throughout the region, were likely to believe and to tell their patients that contraceptives entailed serious risks of side effects (Hord et al. 1991; Remennick 1991; Popov et al. 1993; Visser 1993; Ketting 1994; Goldberg and Toros 1994). Induced abortions continue to date to generate income for physicians (Serbanescu et al. 1995), but prescribing contraceptives does not, except for those physicians who are paid for their work in the BFPA clinics. More and more private pharmacies have opened in the country. These pharmacies operate for profit, and are, therefore, reluctant to become involved in the bureaucracy of the contraceptive-subsidy program. They have better channels of access to virtually all medicines and other supplies than do public polyclinics and pharmacies, so the supply of contraceptives to participants in the subsidy program cannot be taken for granted in the women's movement centers even after referrals and prescriptions are obtained.

The regions served by BFPA clinics thus constitute a quasi-experimental population (Lapham and Mauldin 1985; Mauldin and Ross 1991) for assessing the impact of direct, subsidized provision of contraceptive methods (Rosensweig and Wolpin 1986; Harvey 1994; Molyneaux and Gertler 1995). The remainder of the country's regions constitute a quasi-control population that did not receive the "treatment" available from the BFPA clinics. Although initially researchers set out to examine trends and patterns in knowledge about contraceptives and their use, knowledge was widespread and changed little between 1995 and 2000 in Bulgaria. Findings reported here concentrate on the reported use of modern methods, controlling for salient sociodemographic characteristics potentially linked to initial program-placement effects.

Patterns of Change

The Institute of Demography in the Bulgarian Academy of Sciences and the Bulgarian National Statistical Institute cooperated in 1995 to field a survey of a national probability sample of men and women in Bulgaria, known as the Women in the Transition Survey (WTS). The 8,642 male and female respondents were selected by the National Statistical Institute in Sofia from a sampling frame maintained continuously throughout the country. The survey, taken just at the time when family planning programs were being launched, included questions about

contraceptive knowledge, attitudes, and practice and offers a national baseline measure of this information. Details of the sampling procedure (cluster samples of households within randomly selected enumeration districts based on the sampling frame of the National Statistical Institute) and response rates are available in Carlson and Omori (1998). Although most of the clinics were established in capital cities of some of the country's regions (plus Sevlievo in Veliko Turnovo region) prior to 1995, other concurrent research based on utilization statistics from the clinics suggests that it is unlikely that any measurable clinic program effects would have been observed at the time of the 1995 survey. Already by 1995, modern contraceptive use was higher in the BFPA clinic regions than in the women's movement center regions (in villages as well as in capital cities), a disparity that should be understood as a program-placement effect to be controlled with fixed-effects models, rather than as a program effect.

A second survey of a national probability sample of 3,616 women in Bulgaria, known as the Bulgaria Reproductive Health Survey (BRHS), was conducted in 2000 by the National Center for Opinion Research in Sofia, with support from the United States National Institute of Child Health and Human Development through a grant to the University of South Carolina. Sample selection again was performed by the National Statistical Institute using the same sampling frame as that of the 1995 survey, to guarantee maximum comparability of the two surveys. Both surveys slightly underrepresented women between ages 20 and 29 relative to other age groups, but the number of respondents per thousand women in the total population was slightly more consistent across age groups in 2000 than it was for the 1995 survey. Other compositional differences between the samples preclude unstandardized comparisons of results. For example, the 1995 survey included smaller proportions of women at lower educational levels within all age groups and higher proportions of women at the highest educational levels. The 2000 survey exhibits higher proportions of never-married women at each age, which realistically may represent a shift in the underlying population. Because contraceptive knowledge and use are related to marital status (Li and Newcomer 1996), education, and age, such different proportions across the samples must be controlled before any comparisons are made. These and similar dimensions of social structure also may differentiate the BFPA clinic and women's center areas from each other, accounting for part of observed initial differences between the two contraceptive practices.

Family planning research in developing countries often identifies a link between labor-force participation for women and contraceptive use. This factor failed to demonstrate any significant relation to response patterns concerning contraceptive knowledge and use in Bulgaria, illustrating how traditional family planning research models from the developing world must be modified for application in different settings such as eastern Europe. Similarly, a question about whether women want any more children may show whether contraceptive use can be considered spacing behavior as well as stopping behavior. In the Bulgarian sample, substantial proportions of women who wanted additional children declared that they were using modern methods of contraception, indicating the importance to them of spacing behavior. Wanting no more children, therefore, did not prove to be a statistically significant predictor of the prevalence of modern contraceptive use. Finally, information about income levels and trends would be almost impossible to use for Bulgaria in the 1990s. Roller-coaster inflation and deflation made nonsense of comparisons from one year or even one month to the next. Employment or unemployment also would have different implications for a household, depending on the month it occurred within a year. None of these factors (labor-force participation, income levels, desire for additional children) were considered in final models accounting for contraceptive-use differentials between BFPA clinics and women's movement center areas.

For this study, a multilevel approach is required in order to specify contextual effects on individual outcomes (Mason et al. 1983; Goldstein 1987; Smith 1989; Brykand Raudenbush

1992; DiPrete and Forristal 1994). Multilevel models are designed to allow for effects at both the individual and unit levels, by simultaneously estimating within-unit and between-unit equations. Individual-level outcomes and regressors are estimated within each unit, and the regression coefficients are treated as dependent variables for the between-unit equations (Entwisle et al. 1989; Bryk and Raudenbush 1992; DiPrete and Forristal 1994; Entwisle et al. 1996). Models reported here were derived using aML multiprocess multilevel computer software (Lillard and Panis 2000). Separate models are reported here for 1995 and for 2000 (see Appendix Table A1). Restricting analysis to sexually active women only, models for each year show determinants of modern contraceptive use. Variables that are significant in either model are included in both for comparability.

The within-region models estimated separately for 1995 and for 2000 are:

$$\ln(\text{users/nonusers})_{ij} = \beta_{0j} + \beta_{1j}(\text{basic education}) + \beta_{2j}(\text{higher education}) + \beta_{3j}(\text{married}) + \beta_{4j}(\text{divorce}) + \beta_{5j}(\text{Turkish}) + \beta_{6j}(\text{Roma}) + \text{spline}(\text{age}, 6 \text{ segments})$$

(1)

The left-hand outcome term is the natural logarithm of the ratio of users to nonusers of modern contraceptive methods for subgroup; j . These models are estimated for $j = 55$ areas, distinguishing capital cities of each of the 28 regions of the country except Sofiaska region (which has the national capital, Sofia, as its administrative center) from other towns and villages in each region.

Indicator (dummy) variables for educational level measure basic or higher education, with middle levels of education as the omitted reference category. For marital status, married and divorced also appear as indicator variables, with single (never-married) women representing the omitted reference category. The small number of widows younger than 45 captured by these surveys were unlikely to be sexually active or to be using contraceptives, and have been omitted from this analysis. The two major ethnic minorities in the population, Turkish and Roma respondents, represent the third set of indicator variables controlling for social characteristics, with the ethnic Bulgarian majority as the omitted reference category in the equation. The surveys also asked about religion. Muslim ethnic Bulgarians form a distinct group in the country. In terms of contraceptive use, however, these respondents closely resembled other non-Muslim ethnic Bulgarians rather than Muslim Turks. Religion did not exhibit as much predictive power in preliminary models as did ethnicity.

Finally, the important relation of contraceptive use to age is modeled as a continuous spline function, one of the advantages allowed by use of the aML software. This function allows estimation of a smooth age pattern for the outcome variable (in this case modern contraceptive use), making it superior to the use of indicator variables for age groups. It allows separate slope estimates to be derived for any combination of intervals along the continuous age dimension, making it more flexible and closer to the data than, for example, a parameterization of age as a polynomial (such as age plus age squared). Chosen spline intervals represent five-year segments of exact age, to allow cohort as well as period comparisons of results from the two survey years.

Table 1 shows the distribution of respondents in 1995 and 2000 across categories of these individual-level variables, as well as across the five aggregate-level program areas. Only

respondents who reported themselves as currently sexually active figure in this analysis. Therefore, a smaller proportion of the 2000 sample is included than of the 1995 sample, because the share of women reporting current sexual activity declined slightly from one survey to another (net of the effects of all considered control variables).

Between-region effects reflect fitted slopes and intercepts for the program areas:

$$\beta_{0j} = \beta_{01} (\text{Sofia}) + \beta_{02} (\text{center cities}) + \beta_{03} (\text{clinic regions}) + \beta_{04} (\text{center regions}) + u_{0j} \quad (2)$$

One indicator variable represents Sofia. The group of greatest interest, respondents from regional capitals where the special BFPA clinics were established, is the omitted reference category at this level of the multilevel modeling. The remaining indicator variables group respondents into those in the regional capitals where women's movement information centers were established, the surrounding regions of the BFPA clinic regions, and the surrounding regions of the information center regions.

Results for Sociodemographic Control Variables

As shown in Figure 2 (based on data shown in the Appendix), the social characteristics of sexually active Bulgarian women of childbearing age affect their use of modern contraceptives. In both the 1995 and 2000 samples, more education means more contraceptive use. Married women used contraceptives less than did never-married women, whereas the level of use for divorced women fell somewhere in between. The ethnic Bulgarian majority used modern contraceptives more than did women in either of the major ethnic minorities in the country.

Between 1995 and 2000, shifts appear for modern contraceptive use within each category of respondents, and the distribution of respondents across these categories also changed. Rapid delays of first marriage between 1995 and 2000 produced more sexually active single women (with their higher levels of contraceptive use). This distributional change was counteracted, however, by slight declines in modern contraceptive use within most categories of marital status. The two types of shifts effectively cancelled each other out, and the net effect was that no statistically significant change in contraceptive use was attributable to marital status differences between surveys.

On the other hand, a large out-migration in the late 1990s of ethnic Turks to Turkey appears to have been highly selective for practicing contraception. Therefore, the share of Turkish respondents who indicated current use of modern contraceptives fell by nearly one-third in only five years. (Of course, the 2000 survey also may have captured a more representative sample of the Turkish population, including more women at lower educational levels and so on.) The difference between the 1995 and 2000 coefficients for being Turkish was statistically significant at the 0.05 level (shown in Appendix Table A1).

The most telling shift in contraceptive use, however, appears within educational levels. Although use of modern contraceptives fell by 12 percent (from 75 to 65 percent) for women with only a basic level of education, and also fell 2.5 percent for the majority of women in the middle educational category, modern contraceptive use increased by 5 percent (from 79 to 83 percent) among the minority of women with higher education. Although the drop for women with basic education was not statistically significant because of the relatively large standard errors of the estimated parameters, the gains for women with higher education were statistically significant. This finding illustrates the crucial factor behind all of these generally dismal results, namely the devastating economic stagnation and anarchy that reduced more and more Bulgarian families to destitution during the 1990s. In 1996 and 1997 alone, the gross domestic

product of the country contracted by nearly 20 percent. In 1997, inflation was an astonishing 1,279 percent, a rate that wage increases could not begin to match. As described by the International Labor Organization's study of world employment in 1996-97 (ILO 1996):

One of the most dramatic developments since the beginning of the transition process in 1990 has been the explosive rise in unemployment.... A particularly disturbing aspect has been the emergence of long-term unemployment which is estimated to affect between a quarter and two-thirds of all job seekers. Women, youths, older workers and the low-skilled account for a disproportionate number of those without jobs for more than 12 months and overall figures are increasing continuously. . . . Compounding the problem, real wages have fallen sharply throughout the region as a result of initially high inflation and the collapse of output. Rising poverty together with huge and growing gaps in distribution of income cannot but lead to social tensions which, left unaddressed, could ultimately threaten the transition process itself.

The use of modern contraceptives depends in part on their availability and affordability, which sets them in contrast with the nonmonetized traditional forms of contraception. Only women who managed to benefit from the transition process economically were in any position to invest in modern contraceptive methods as one means to achieving their life goals, including their desired number and timing of children. Some women likely gave up on modern contraceptives as too expensive and relied on less effective but affordable traditional methods. A separate analysis of the prevalence of traditional practices (not reported here) reveals, however, that the reliance on such practices declined as well during this period. As a result, the proportion of currently sexually active women who reported no contraceptive use at all increased slightly from 1995 to 2000.

For Bulgarian women younger than 25, modern contraceptive use increased between the two surveys, after controlling for other social characteristics. Figure 3 plots a continuous spline function for each year, with slope estimates for five-year age groups. It shows that contraceptive use increased sharply among women between ages 15 and 24, whereas it remained virtually unchanged for those older than 25. In particular, the change between 1995 and 2000 in the coefficient of the spline function between ages 20 and 24 was statistically significant.

This figure is another way of demonstrating the observation made above about a small minority of Bulgarian women who have managed to benefit from the transition period (and who are therefore in a position to buy and use modern contraceptives), while most women have lost ground in this respect. From Figure 3, such women appear to be younger than those who did not so benefit, better educated, never married, and of Bulgarian ethnicity.

Results for BFPA Program Areas

At the level of program areas, the statistical results show no evidence of any program effect for the special BFPA clinics. Modern contraceptive use did not increase more in the regional capitals where such clinics were established in the early and mid-1990s. If anything, slower progress occurred in these cities.

Figure 4 presents levels of contraceptive use estimated for each of the program areas, estimated as aggregate-level effects with controls for sociodemographic factors in the multilevel structure of the model used here. Results shown for each area refer to unmarried, ethnic Bulgarian women at exactly age 30, with middle levels of education. Estimates for other control-group categories simply shift up or down proportionately in accordance with different proportional hazards for those categories (shown in Figures 2 and 3).

Figure 4 illustrates that for most of the country, use of modern contraceptive methods dropped slightly between 1995 and 2000. In the capital city of Sofia, use remained virtually unchanged

at more than 75 percent of all sexually active women. In the rural areas of the countryside, levels of use dropped slightly, and slightly more in the rural areas of regions where BFPA clinics had been established. None of these differences between coefficients for the two models is significantly different from zero, meaning no statistically significant changes in use can be identified in these areas.

The regional capitals of the country, however, provide the most important comparison. The BFPA clinics and women's movement information centers were opened in these cities. The former provided one-stop, subsidized direct provision of modern contraceptives. The latter provided essentially only good advice. The only evidence of a statistically significant increase in modern contraceptive use for program areas (see Appendix Table A1) occurs in the cities with the women's movement information centers. A slight drop in use is estimated for the BFPA clinic cities, although the shift is not statistically significant.

Conclusion

The decade of the 1990s proved to be disappointing and frustrating in Bulgaria, not only for family planning advocates but also for the population of the country itself. Political corruption and paralysis, economic stagnation, rising inequality, and social chaos contributed to a climate of pessimism and desperation for a growing majority of the people in the country.

Against this somber backdrop, the Bulgarian Family Planning Association obtained international cooperation and support for a program of special clinics to expand the choices available to women as they sought to achieve their reproductive goals. They managed to open individual clinics in about one-third of the regional capitals. After five years, no evidence can be found from these two national surveys that these clinics have had an independent effect on levels of modern contraceptive use, after controls are introduced for key sociodemographic factors. In fact, observed gains have come in the other non-BFPA regions of the country. Given the limited scale of the BFPA effort, perhaps this result should not be surprising. In the 2000 BRHS survey, women were asked, "Do you know of any special center where you can go for information about methods for preventing pregnancy?" Only 10 percent of the sample indicated that they knew of such places. Only 5 percent knew anyone else who had visited such clinics, and less than three percent had ever visited such a clinic or center themselves. (This question would apply to the women's centers as well as to BFPA clinics, further diluting evidence of the BFPA clinics' impact on knowledge and behavior.) One stated intention of the program, to have a measurable impact on the attitudes and behavior of the population of the country, was not achieved.

The statistically significant observed increase in contraceptive use in regional capitals without BFPA clinics may reflect existence of initial program-placement effects. In 1995, modern contraceptive use was high in Sofia and in the BFPA-region capitals and low in the other regional capitals and in all rural areas, as shown in Figure 4. By 2000, the level of modern contraceptive use in non-BFPA-region capitals had risen to the level found in Sofia and the BFPA-region capitals, leaving a consistent urban-rural difference. This finding may be evidence that the non-BFPA-region capitals were catching up to the other urban areas of the country in some macroeconomic sense. Even were that the case, the BFPA clinics remain without a specific program effect.

The statistically significant increase in modern contraceptive use among women younger than 25 might suggest that BFPA clinics affected women at these impressionable ages, while behavioral inertia of older women muffled the significance of this effect in statistical models. Unfortunately, repeating the statistical analysis separately for only these youngest women (and thus without an age variable) preserves the basic conclusion. Also, within this youngest group,

the only areas showing noticeable increases in modern contraceptive use were regional capitals without BFPA clinics.

The cumulative effect of direct contact with these clinics, as it ripples outward through social networks in affected communities (Montgomery and Casterline 1993; Rosero-Bixby and Casterline 1993; Kohler 1997) may, in fact, require more than five years to manifest itself. Continued availability of induced abortion as the normative means of fertility control in the country may well reduce women's interest in contraceptives, particularly if doctors continue to promote reliance on abortion. This argument fits well with the fact that women over 25 (who entered reproductive ages during the state socialist period) show no change in contraceptive use, whereas younger women show clear increases in use. In this case, although clinics may not be having discrete local impacts, the shift from abortion to contraception may be proceeding more broadly as a cohort phenomenon in the country as a whole, regardless of the local presence of clinics with subsidized direct delivery of services.

Other critical regional-level factors may exist that have not been considered in this initial analysis of these two surveys. Addition of macro-level measures of economic and social conditions (Grady et al. 1993; Gertler and Molyneaux 1994) in each region and its capital city (such as changes over time in employment, transportation, and the like) could modify coefficients throughout the present model. Although this approach might dispel the gains found in modern contraceptive use observed in non-BFPA-region capitals, the same factors would have to act in an opposite fashion in the BFPA regions to create a program effect attributable to the clinics. Such a peculiar pattern is difficult to imagine. Although clearly more analysis is warranted, the findings from this analysis make clear that no direct evidence exists for any broad demographic program effects linked to five years of activity in the BFPA clinics in Bulgaria.

Acknowledgments

This study is based on research conducted with support from the United States National Institute of Child Health and Human Development through a grant to the University of South Carolina. An earlier version of this manuscript was presented to the Population Association of America in Washington, DC, April 2001. The authors acknowledge the suggestions and criticisms of Marta Sougareva, Tatyana Kotzeva, and Dimiter Philipov. This report was written with support from the Max Planck Institute for Demographic Research, Rostock, Germany.

Appendix

Appendix Table A1

Model results for the 1995 Women in Transition Survey and the 2000 Bulgarian Reproductive Health Survey

Carlson and Lamb

Page 10

Parameter	Percentage using modern methods ^a	Coefficient ^b (1995)	Standard error	t-value	Percentage using modern methods ^a	Coefficient ^b (2000)	Standard error	t-value
Intercept	0.765	1.182	(0.365)	3.241	0.746	1.078	(0.305)	3.538
Program area								
Grad Sofia	0.775	0.057	(1.308)	0.044	0.780	0.190	(1.739)	0.109
Clinic cities	0.765	0.000			0.746	0.000		
Center cities	0.683	-0.413	(0.182)	-2.278	0.796	0.283	(0.130)	2.185
Clinic other	0.680	-0.427	(0.202)	-2.120	0.624	-0.572	(0.196)	-2.923
Center other	0.672	-0.464	(0.155)	-2.991	0.669	-0.375	(0.121)	-3.097
Education								
Basic	0.745	-0.109	(0.181)	-0.602	0.654	-0.442	(0.190)	-2.323
Middle	0.765	0.000			0.746	0.000		
Higher	0.787	0.124	(0.160)	0.778	0.826	0.480	(0.122)	3.918
Marital status								
Single	0.765	0.000			0.746	0.000		
Married	0.617	-0.706	(0.254)	-2.776	0.532	-0.950	(0.252)	-3.765
Divorced	0.665	-0.499	(0.449)	-1.111	0.629	-0.549	(0.395)	-1.390
Ethnicity								
Bulgarian	0.765	0.000			0.746	0.000		
Turkish	0.736	-0.159	(0.199)	-0.797	0.497	-1.090	(0.217)	-5.031
Roma	0.595	-0.796	(0.310)	-2.568	0.514	-1.023	(0.254)	-4.031
Age (spline) ^b								
15-19		-0.102	(0.196)	-0.520		-0.143	(0.201)	-0.709
20-24		0.221	(0.071)	3.133		0.018	(0.098)	0.188
25-29		0.022	(0.065)	0.336		0.006	(0.063)	0.093
30-34		0.003	(0.056)	0.057		0.009	(0.050)	0.171
35-39		-0.086	(0.061)	-1.419		-0.002	(0.060)	-0.039
40-44		-0.044	(0.072)	-0.610		-0.169	(0.080)	-2.101

^aPercentage = $1 - [1 / (1 + \exp(\text{coefficient} + \text{coefficient of intercept}))]$; numbers in boldface are significantly different for 1995-2000.

^bCoefficient = intercept for women exactly age 30 (reported age 30 - 0.5). For each exact age below 30, subtract coefficient for that age group from coefficient for next-oldest age. For each age above 30, add coefficient for that age group to coefficient for next-youngest age.

References

- Beric B, Kupresanin M, Kapor-Stanulovic N. Accidents and sequelae of medical abortions. *American Journal of Obstetrics and Gynecology* 1973;116(6):813–821. [PubMed: 4715939]
- Berger, Charlene; Dolores Gold, David Andres, et al. Repeat abortion: Is it a problem? *Family Planning Perspectives* 1984;16(1):70–75. [PubMed: 6723941]
- Blayo, Chantal. Les modes de prevention des naissances en Europe de l'Est. *Population* 1991;46(3):527–546.
- Bongaarts, John; Bruce, Judith. The causes of unmet need for contraception and the social content of services. *Studies in Family Planning* 1995;26(2):57–75. [PubMed: 7618196]
- Bryk, Anthony S.; Raudenbush, Stephen W. *Hierarchical Linear Models: Applications and Data Analysis Methods*. Sage; Newbury Park, CA: 1992.
- Carlson, Elwood; Bernstam, Mikhail S. Population and resources under the socialist economic system. *Population and Development Review* 1991;16(Supplement):374–407.
- Carlson, Elwood; Omori, Megumi. Fertility regulation in a declining state socialist economy: Bulgaria, 1976-1995. *International Family Planning Perspectives* 1998;24(4):184–187.
- David, Henry P. *Family Planning and Abortion in the Socialist Countries of Central and Eastern Europe*. Population Council; New York: 1970.
- David, Henry P. Abortion in Europe 1920-91: A public health perspective. *Studies in Family Planning* 1992;23(1):1–22.
- David, Henry P.; Skilogianis, J. *From Abortion to Contraception*. Greenwood Press; Westport CT: 1999.
- DiPrete, Thomas A.; Forristal, JD. Multilevel models: Methods and substance. *Review of Sociology Annual* 1994;20:331–357.
- Dixon-Mueller, Ruth; Germain, Adrienne. Stalking the elusive “unmet need” for family planning. *Studies in Family Planning* 1992;23(5):330–335. [PubMed: 1475801]
- Entwisle, Barbara; Casterline, John; Sayed, HA. Villages as contexts for contraceptive behavior in rural Egypt. *American Sociological Review* 1989;54(6):1,019–1,034.
- Entwisle, Barbara, et al. Community and contraceptive choice in rural Thailand: A case study of Nang Rong. *Demography* 1996;33(1):1–11. [PubMed: 8690134]
- Frejka, Tomas. Induced abortion and fertility. *Family Planning Perspectives* 1985;17(5):230–234. [PubMed: 3842663]
- Gertler, Paul; Molyneaux, John. How economic development and family planning programs combined to reduce Indonesian fertility. *Demography* 1994;31(1):33–64. [PubMed: 8005342]
- Goldberg, Howard; Toros, Aykut. The use of traditional methods of contraception among Turkish couples. *Studies in Family Planning* 1994;25(2):122–128. [PubMed: 8059445]
- Goldstein, H. *Multilevel Models in Educational and Social Research*. Griffin; London: 1987.
- Grady, William; Klepinger, David; Billy, John. The influence of community characteristics on the practice of effective contraception. *Family Planning Perspectives* 1993;25(1):4–11. [PubMed: 8432376]
- Harvey, Philip D. The impact of condom prices on sales in social marketing programs. *Studies in Family Planning* 1994;25(1):52–58. [PubMed: 8209395]
- Henshaw, Stanley K.; Silverman, J. The characteristics and prior contraceptive use of US abortion patients. *Family Planning Perspectives* 1988;20(4):158–169. [PubMed: 3243346]
- Henshaw, Stanley K.; Silverman, J. *Induced Abortion, a World Review*. Alan Guttmacher Institute; New York: 1990.
- Hord, Charlotte; David, Henry P.; Donnay, France; Wolf, Merrill. Reproductive health in Romania: Reversing the Ceausescu legacy. *Studies in Family Planning* 1991;22(4):231–240. [PubMed: 1949105]
- International Labor Organization (ILO). *World Employment 1996-97*. ILO; Geneva: 1996.
- Ketting, Evert. Family planning in central Asia: Views of health professionals. *Planned Parenthood in Europe* 1994;23(3):20–24.
- Klijzing, Eric. *Revue Baltique. Unmet family planning needs in Europe?: 1999*. p. 120-136.

- Kohler, Hans-Peter. Learning in social networks and contraceptive choice. *Demography* 1997;34(3):369–383. [PubMed: 9275246]
- Lapham, Robert J.; Mauldin, W. Parker. Contraceptive prevalence: The influence of organized family planning programs. *Studies in Family Planning* 1985;16(3):117–137. [PubMed: 4012818]
- Levin AA, Schoenbaum SC, Morson RR, et al. Association of induced abortion with subsequent pregnancy loss. *Journal of the American Medical Association* 1980;243(24):2,495–2,499.
- Li, Rose Maria; Newcomer, Susan F. The exclusion of never-married women from Chinese fertility surveys. *Studies in Family Planning* 1996;27(3):148–154. [PubMed: 8829297]
- Lillard, Lee; Panis, Constantine. *aML User's Guide and Reference Manual*. EconoWare; Los Angeles: 2000.
- Masarliev A, Grozdanov G, Malinova M. Dinamika i struktura na abortite prez perioda 1981-88" [dynamics and structure of abortions 1981-88]. *Akousherstvo i Ginekologia* 1990;29(1):37–41.
- Mason, William M.; Wong, GY.; Entwisle, Barbara. Contextual analysis through the multilevel linear model. In: Leinhard, S., editor. *Sociological Methodology* 1983-84. Jossey-Bass; San Francisco: 1983. p. 72-103.
- Mauldin, W. Parker; Ross, John A. Family planning programs: Efforts and results, 1982-89. *Studies in Family Planning* 1991;22(6):350–367. [PubMed: 1792675]
- Mazur, Peter. Social and demographic determinants of abortion in Poland. *Population Studies* 1975;29(1):21–26.
- Molyneaux, John; Gertler, Paul. *Contraceptive Demand and Family Planning Subsidies*. East-West Center, Program on Population; Honolulu: 1995.
- Montgomery, Mark; Casterline, John. The diffusion of fertility control in Taiwan: Evidence from pooled cross-section time-series models. *Population Studies* 1993;47(3):457–479. [PubMed: 11613198]
- Okolski, Marek. Abortion and contraception in Poland. *Studies in Family Planning* 1983;14(11):263–274. [PubMed: 6648995]
- Patelakis SN, Papadimitriou BD, Doxiadis SA. Influence of induced and spontaneous abortions on the outcome of subsequent pregnancies. *American Journal of Obstetrics and Gynecology* 1973;116(6):799–805. [PubMed: 4736738]
- Popov, Andrej; Adriaan Ph. Visser, A.; Ketting, Evert. Contraceptive knowledge, attitudes, and practice in Russia during the 1980s. *Studies in Family Planning* 1993;24(4):227–235. [PubMed: 8212092]
- Remmennick L. Epidemiology and determinants of induced abortion in the USSR. *Social Science and Medicine* 1991;33(6):841–848. [PubMed: 1948176]
- Rodríguez, Germán; Goldman, Noreen. An assessment of estimation procedures for multilevel models with binary responses. *Journal of the Royal Statistical Society, Series A* 1995;158(1):73–89.
- Rosensweig, Mark; Wolpin, Kenneth. Evaluating the effects of optimally distributed public programs: Child health and family planning interventions. *American Economic Review* 1986;76(3):70–82.
- Rosero-Bixby, Luis; Casterline, John. Modelling diffusion effects in fertility transition. *Population Studies* 1993;47(1):147–167.
- Serbanescu, Fiorina; Morris, Leo; Stupp, Paul; Stanescu, Alin. The impact of recent policy changes on fertility, abortion and contraceptive use in Romania. *Studies in Family Planning* 1995;26(2):76–87. [PubMed: 7618197]
- Skjeldestad, Finn E. Using induced abortion to measure contraceptive efficacy. *Family Planning Perspectives* 1995;27(2):71–73. 95. [PubMed: 7796899]
- Smith, Herbert L. Integrating theory and research on the institutional determinants of fertility. *Demography* 1989;26(2):171–184. [PubMed: 2659399]
- Thapa, Shyam; Kumar, Sushil; Cushing, Jeanne, et al. Contraceptive use among postpartum women: Recent patterns and programmatic implications. *International Family Planning Perspectives* 1992;18(3):83–92.
- Thomas L. Availability of contraceptives in eastern Europe. *IPPF Medical Bulletin* 1991;25:3–4. [PubMed: 12284650]
- Tietze, Christopher. The demographic significance of legal abortion in eastern Europe. *Demography* 1964;1(1):119–125.

Visser, Adriaan; Remmennick, L.; Bruyniks, N. Contraception in Russia: Attitude, knowledge and practice of health professionals. *Planned Parenthood in Europe* 1993;22(2):26–29. [PubMed: 12287105]

World Health Organization (WHO). *From Abortion to Contraception: Tblisi Conference 10-13/10/1990*. World Health Organization; Copenhagen: 1991.

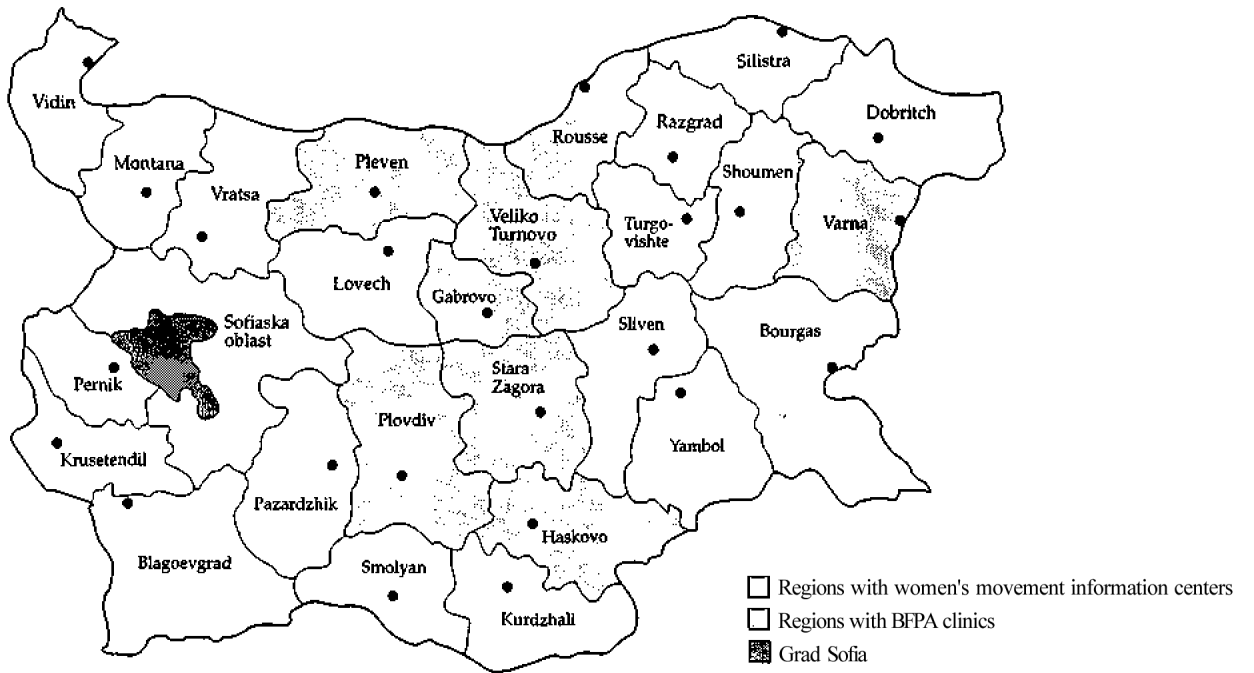


Figure 1.
Regions of Bulgaria, by program area

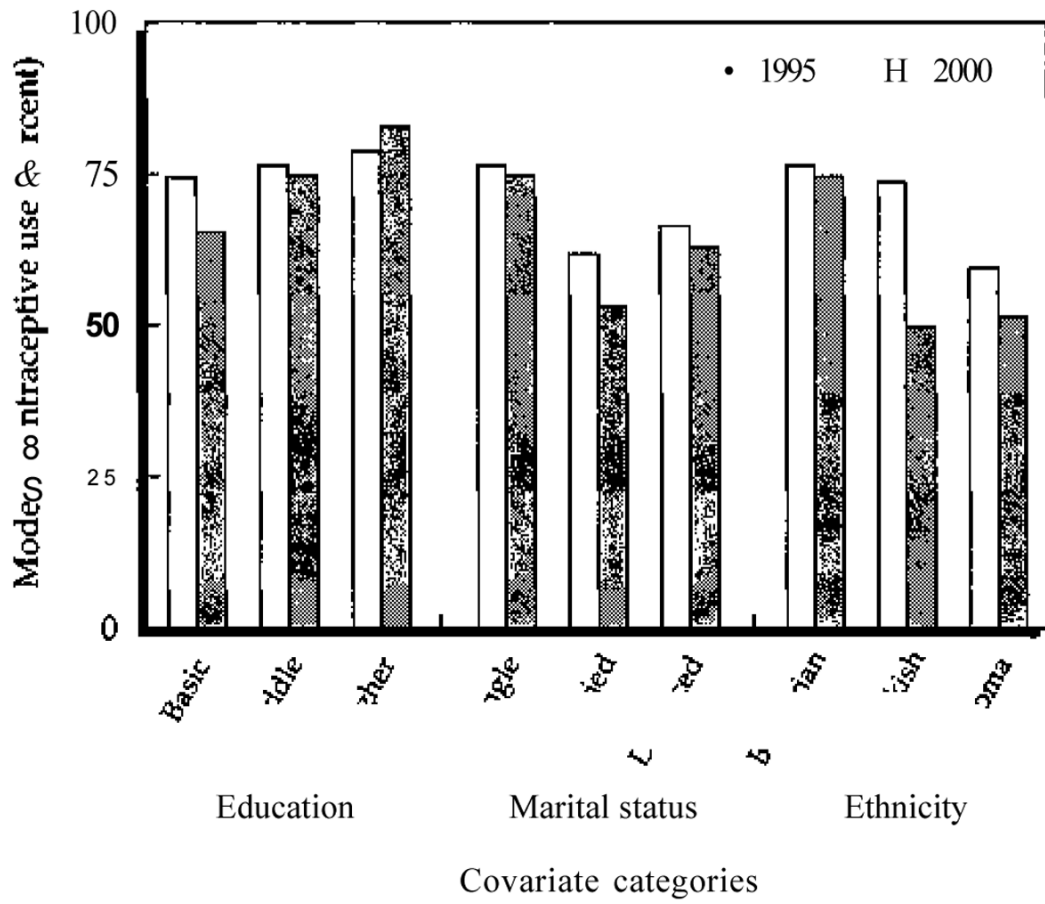


Figure 2.
Controls for social characteristics, Bulgaria

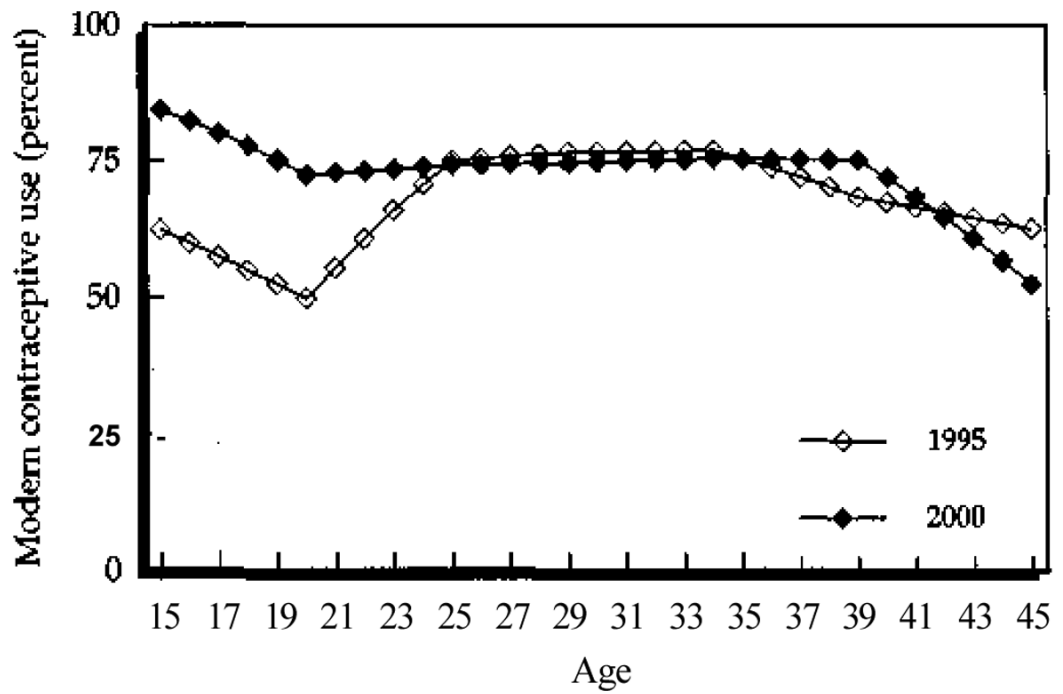


Figure 3.
Contraceptive use, by age, Bulgaria, 1995 and 2000

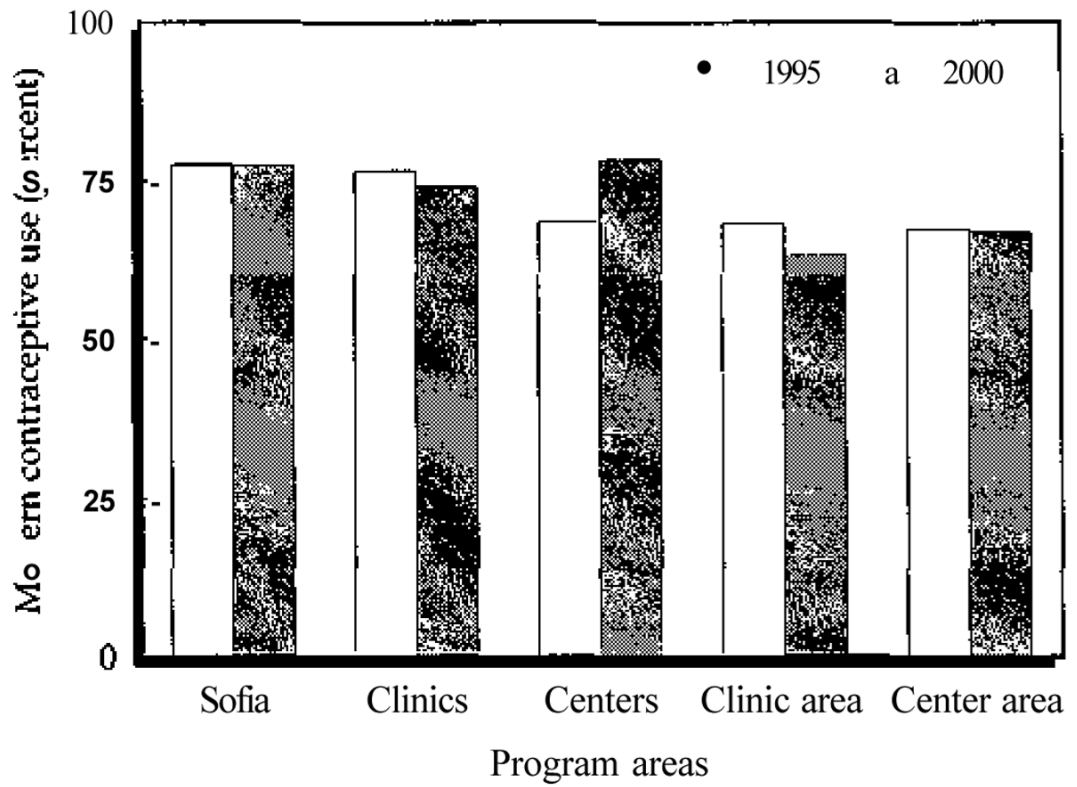


Figure 4.
Contraceptive use, by program area, Bulgaria, 1995 and 2000

Table 1
Percentage distribution of selected variables for multilevel models, Bulgaria

Variable	Number of cases (1995)	Percent	Number of cases (2000)	Percent
Total sample ^a	1,987	(100)	2,271	(100)
Education				
Basic	339	(17.1)	524	(23.1)
Middle ^b	1,226	(61.7)	1,222	(53.8)
Higher	422	(21.2)	525	(23.1)
Marital status				
Single ^b	216	(10.7)	440	(19.4)
Married	1,703	(85.8)	1,751	(77.1)
Divorced	68	(03.5)	80	(03.5)
Ethnicity				
Bulgar ^b	1,732	(87.6)	1,804	(79.4)
Turk	168	(08.5)	233	(10.3)
Roma	78	(03.9)	234	(10.3)
Age group (for spline)				
15-19	105	(05.3)	132	(05.8)
20-24	290	(14.6)	356	(15.7)
25-29	374	(18.7)	379	(16.7)
30-34	350	(17.7)	453	(19.9)
35-39	425	(21.4)	484	(21.3)
40-44	443	(22.3)	467	(20.6)
Program areas ^c				
Sofia	287	(14.5)	360	(15.8)
Clinic cities ^b	343	(17.1)	349	(15.4)
Center cities	321	(16.2)	392	(17.3)
Clinic other	378	(19.1)	429	(18.9)
Center other	658	(33.1)	741	(32.6)

Source: 1995 Women in the Transition Survey and 2000 Bulgarian Reproductive Health Survey.

^aIncludes only female respondents between ages 15 and 45 who identified themselves as sexually active at the time of the survey. Widows are excluded; the number of widows is too small for reliability.

^bCategory selected as reference group; omitted category for indicator variables. (Continuous spline for age does not involve indicators; exact age 30 set to zero for estimation of models.)

^cRegions with BFPA clinics include Gabrovo, Haskovo, Plevan, Plovdiv, Rousse, Stara Zagora, Varna, and Veliko Turnovo. (Two BFPA clinics also opened in the city of Sofia.)