

Working Paper A09/01

Applications and Policy

The Correlates Of Natural Method Use In Moldova: Is Natural Method Use Associated With Poverty And Isolation?

Mark J. Lyons-Amos, Gabriele B. Durrant, Sabu S. Padmadas

Abstract

Natural method use is often associated with high levels of unwanted births and induced abortions. This study investigates the correlates of natural method use in Moldova, a country with one of the highest proportions of natural contraceptive users in Europe. We hypothesize that economic and spatial disadvantage increase the reliance on natural methods whereas exposure to FP programs decreases the probability of natural method use. The analysis considers a sub-sample of 5860 sexually-active women from the 2005 Demographic and Health Survey. Results from multilevel multinomial models, controlling for relevant characteristics and data structure, show that economic disadvantage increases the probability of natural method use; but the overall effect is small. Higher FP media exposure reduces natural method use; however this effect attenuates with age. We conclude that FP efforts directed towards the poorest may have limited impact, but interventions targeted at older women could reduce the burden of unwanted pregnancies.

The correlates of natural method use in Moldova:
Is natural method use associated with poverty and isolation?

Mark J. Lyons-Amos, Gabriele B. Durrant & Sabu S. Padmadas

*Division of Social Statistics and Southampton Statistical Sciences Research Institute,
University of Southampton, United Kingdom*

Correspondence

Mark J. Lyons-Amos

Division of Social Statistics & Southampton Statistical Sciences Research Institute

School of Social Sciences

University of Southampton

Highfield Campus

Southampton SO17 1BJ

United Kingdom

Email: mja303@soton.ac.uk

Tel: 0044-23-8059-3317

Fax: 0044-23-8059-3846

Word count

Abstract: 150 words

Main text (without references): 4859

The correlates of natural method use in Moldova: Is natural method use associated with poverty and isolation?

Abstract

Natural method use is often associated with high levels of unwanted births and induced abortions. This study investigates the correlates of natural method use in Moldova, a country with one of the highest proportions of natural contraceptive users in Europe. We hypothesize that economic and spatial disadvantage increase the reliance on natural methods whereas exposure to FP programs decreases the probability of natural method use. The analysis considers a sub-sample of 5860 sexually-active women from the 2005 Demographic and Health Survey. Results from multilevel multinomial models, controlling for relevant characteristics and data structure, show that economic disadvantage increases the probability of natural method use; but the overall effect is small. Higher FP media exposure reduces natural method use; however this effect attenuates with age. We conclude that FP efforts directed towards the poorest may have limited impact, but interventions targeted at older women could reduce the burden of unwanted pregnancies.

Words: 150

Introduction

The Republic of Moldova has a high proportion of natural contraceptive users compared to most European countries. Natural methods comprise 34% of all contraceptive use in Moldova (NCPM and ORC Macro 2006), which is considerably higher than Western European countries (for example 4.5% in Germany and 2.9% in the Netherlands) and other former Soviet regions (8.7% in Latvia, 9.0% in Hungary and 15.7% in Bulgaria) and still higher than other South-East European countries (32.0% in Romania and 29.5% in Ukraine) (United Nations 2007, NCPM and ORC Macro 2006).

The high reliance on natural methods may contribute to a high level of unwanted births and continued high demand for induced abortion in Moldova, (National Scientific and Applied Center for Preventive Medicine 2006), which functions as a key mechanism for birth control and in achieving the low fertility rate of 1.7 children per woman in the country (NCPM and ORC Macro 2006). The determinants of high natural method use are poorly understood not only within the Eastern European setting but also more generally. Despite the significance of natural methods in the global method mix, there is still a lack of research on natural method use (Rogow and Horowitz 1995). The majority of studies within the existing academic literature either ignore natural contraceptives and define contraceptive use as the use of a modern contraceptive (Westoff 2005, Swar-Eldahab 1993, Pariani et al. 1991) or focus on the determinants of different modern methods with natural methods as a residual method (Magadi and Curtis 2003).

The probability of contraceptive failure is much higher for natural methods when compared to modern contraceptives. Westoff (2005) estimates that the failure of natural methods accounts for 43% of unwanted conceptions in Moldova compared to

only 20% for modern methods. Within Moldova and other former-Soviet countries high contraceptive failure rates often result in induced abortion (NCPM and ORC Macro 2006, Westoff 2005, Agadjanian 2002), which has major public health implications. Approximately 38% of Moldovan maternal deaths in 2003 resulted from abortion related complications, often following repeat abortions after two or more unwanted pregnancies (NCPM and ORC Macro 2006). To address this problem, the Moldovan government launched the National Program in Family Planning and Protection for Reproductive Health (NPRH), which focuses primarily on reducing the number of unwanted births and induced abortions (NCPM and ORC Macro 2006). As part of this initiative, the National Program for combating HIV/AIDS (NPAIDS) was also introduced to improve AIDS awareness and increase condom use among high risk groups. It has to be acknowledged that Family Planning (FP) programs in post-communist Eastern Europe generally have had poor results mainly attributed to social turmoil and economic instability. For example, Carlson and Lamb (2001) reported that the FP programs in Bulgaria had no impact in improving access to clinics as a result of the economic crisis in the post-Soviet era. Serbanescu et al. (1995) pointed out that the uptake of modern methods in Romania is severely limited by the high cost of contraception. Moldova has experienced severe economic collapse since independence in 1991, with GDP falling to 34% of its 1991 level by 2005 (NCPM and ORC Macro 2006), which may imply that Moldovan FP programs may also have had only a limited or no impact in promoting modern contraception.

This study uses nationally representative data from the first Moldovan Demographic and Health Survey (MDHS) to identify the correlates of contraceptive use in Moldova, with a particular focus on natural method use. The study examines the joint impact of poverty, geographic isolation and FP programs on the choice of

natural methods, while controlling for socio-demographic and other important factors. This analysis aims to improve our understanding of the determinants of natural method use, expanding knowledge of a neglected area within family planning research. The paper is structured as follows. First the key research hypotheses to be analysed in this paper are discussed. Then the data, the analytical framework and the methods used are presented. The results are then interpreted in light of the research hypotheses. Concluding remarks and recommendations for policy and practice are discussed in the final section.

Research hypotheses

This paper investigates the research hypotheses that economic disadvantage and geographical isolation increase the reliance on natural methods whereas exposure to FP programs decreases the probability of natural method use. The theoretical motivations to the proposed hypotheses are briefly discussed.

Impact of economic status and isolation

The hypothesised effect of economic status on contraceptive use is derived from the Easterlin ‘synthesis’ framework (Easterlin 1979). Couples attempting to control their fertility may be discouraged from using modern contraception by prohibitive costs of use, which comprise market (financial) and psychic costs. Direct market costs may take the form of the costs of buying contraceptive supplies or those associated with a clinical procedure such as IUD insertion. Indirect market costs relate to the opportunity costs in accessing contraception. Psychic costs comprise various forms of opposition to use from the partners, relatives and institutions, for example religious prohibition of use (Santow 1993, 1995). Modern contraceptives have both direct and

indirect market costs in obtaining a method. Natural methods have no direct cost, as no supplies need to be purchased and no clinical consultation is required. Therefore, the direct market cost of modern method use is greater than the market cost of natural method use. Women of lower economic status may be unable to afford the cost of modern contraceptives and may instead use natural methods to prevent conception. Serbanescu et al. (1995) found evidence of this association in Romania where 34.3% of natural method users cited the high costs of modern methods as their primary reason for natural method use. Therefore, the first research hypothesis is that the probability of natural method use will be negatively associated with wealth, with the highest probability of natural method use among women from poorer economic backgrounds. It is anticipated that due to high indirect costs in poorly serviced areas women will make greater use of natural methods as modern contraceptives are inaccessible (Serbanescu et al. 1995).

Impact of Moldovan family planning programs

This study examines three potential effects of FP programs in Moldova. Firstly, the effect of FP media on contraceptive choice is examined. NPRH explicitly encourages the use of modern contraceptives through media campaigns. It is expected that exposure to FP media is therefore associated with a lower probability of natural and higher probability of modern method use. Secondly the effect of the FP program on switching behaviour (last method discontinued) is examined. Switching from natural to modern methods is the main mechanism by which NPRH hopes to reduce unwanted pregnancy (NCPM and ORC Macro 2006). In addition, women who have previously discontinued a natural method may continue to rely on natural methods (Goldburg and Toros 1994, Kost 1993). This association is in part due to women

accepting failure of natural methods and resuming natural method use after birth or induced abortion. Thirdly, the potential impact of NPAIDS on contraceptive behaviour is assessed. Natural methods provide no protection and only condoms offer protection against HIV/AIDS transmission (Kowal 2004). It is expected that exposure to the NPAIDS media campaign will be associated with a lower probability of natural method use, and greater use of modern methods.

Data

The data for this study are drawn from the 2005 Moldova Demographic and Health Survey (MDHS). The survey collates information on family planning, reproductive health, maternal and child health and HIV/AIDS, and included a module on abortion history in recognition of the influential role of induced abortion in the Moldovan fertility control regime (Westoff 2005, Sobotka 2003).

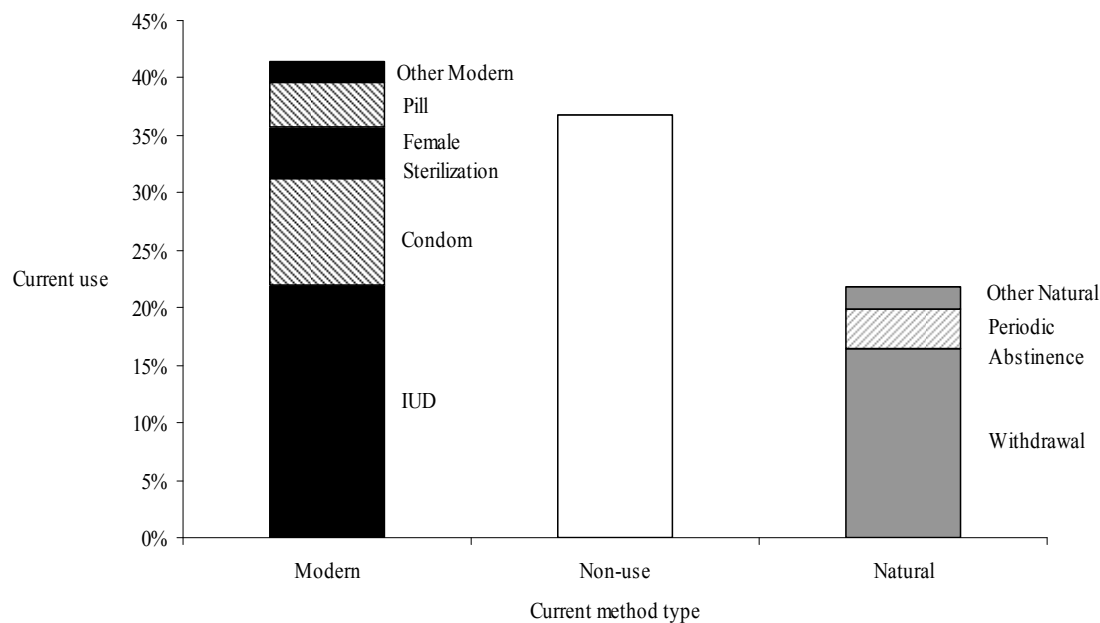
The MDHS has a probability two-stage cluster design. Primary Sampling Units (PSUs) were selected from the sampling frame of the 2004 Moldovan Population and Housing Census. A total of 400 PSUs were selected using a systematic sampling scheme, with probability proportional to population size (PPS) and 30 households within sampled PSUs were selected by systematic sampling. All women aged 15-49 within a household were then interviewed. MDHS is not a self weighting sample, and weighting is required to produce representative estimates. Due to the hierarchical structure of the data, responses between women may be correlated due to area level effects such as those of contraceptive networks (Kohler et al. 2001, Montgomery and Casterline 1996), interviewer effects and other PSU level characteristics. The overall response rate was 95%, although women in rural areas (97.4%) were more likely to respond than women in urban areas (93.5%). The final

MDHS sample consisted of 7440 women, aged 15-49. The analysis excludes women who reported never having had sex (n=1401) and those currently pregnant at the time of survey (n=179) from the sub-sample. These women are conceptually not relevant to the study, and universally use no method. Infecund women are included, since these women may use barrier contraceptives to protect themselves against AIDS. The final analysis sample therefore consists of 5860 women aged 15-49.

Analytical framework

The variable of interest for this analysis is current contraceptive method, defined as three categories: modern method, natural method and non-use. Figure 1 shows the distribution of respondents by method mix. Modern method use contributed to the largest share of overall use, mainly IUD and condom which represent 53% and 23% of any modern method use. The percentage of respondents using a natural method is still substantial, although this is the smallest single category. Almost three-fourths of the natural method users rely on withdrawal.

Figure 1 Percentage of women using different type of current contraceptive method, MDHS 2005



Notes

Proportions adjusted for sampling design

‘Other modern’ consists of vasectomy, injectable, foam and sponge and diaphragm

‘Other natural’ consists of Lactational Amenorrheic Method (LAM) and folkloric methods

Percentages refer to ever sexually active, non-pregnant women

Control variables

The present study includes a range of control variables as identified to be important from previous studies. Three fertility exposure variables are identified: i) exposure to coitus measured in terms of sexual activity and marital status- as women who were not in sexual union were significantly less likely to use contraception than women who are in union (Lindstrom and Munoz-Franco 2005, Magadi and Curtis 2003), ii) fecundity, which assumes that women who are not at risk of conception have no motivation to use contraception and iii) fertility preferences, a key determinant of contraceptive use at the population (Pritchett 1994) and individual level (Robinson

1996). For example, women who express the desire to have children in the near future are less likely to use any contraceptive than women who want to control their fertility.

The analysis also includes relevant socio-demographic variables including respondent's age, parity, recent birth experience, education, ethnicity and religion. Previous studies show that natural method use is concentrated among older women (Magadi and Curtis 2003, Westoff 2000). This relationship is important, as these women are most likely to associate natural method use with induced abortion as a mechanism for fertility control (Westoff 2000, Agadjanian 2002). However, none of these studies test for potential interaction effects of age with other covariates in predicting method choice. Natural method use declines with higher parity (Magadi and Curtis 2003) as women switch to permanent contraceptives. Women's education can be highly significant in determining contraceptive choice. Robinson (1996) uses data from 9 DHS countries and concludes that education effects vary in magnitude and direction by country context. Therefore although a relationship between education and natural method choice may exist, no expected relationship is specified for the Moldovan context. Religion and ethnicity can influence contraceptive choice through social expectations, institutional regulations and cultural values. For example, Roman Catholicism opposes the use of *coitus interruptus* but permits the use of periodic abstinence (Santow 1993, 1995). Westoff (2000) demonstrated that in Kazakhstan ethnic Russian women were less likely to make use of natural methods than native Kazaks.

Methodology

The effects of selected explanatory variables on method choice are modelled using multinomial logistic regression, controlling for the hierarchical data structure and

accounting for unexplained variance resulting from the sampling design. A multilevel model allows for correlation in probabilities of method choice for women living in the same area. Failure to account for such clustering leads to underestimated standard errors and incorrect inferences. An advantage of using a multinomial model, rather than fitting separate binary logistic models for each type of method choice is that the effects of characteristics on the different choices of methods may be evaluated simultaneously and tested for equivalence. Further, the model allows for covariance between the unobserved area influences on the different types of method choices.

The dependent variable, y_{ij} , is current method choice for woman i living in area j which is coded as 0 for users of modern methods (41.4%), 1 for natural method users (21.7%) and 2 for non-users (36.7%), regarded as unordered response categories (see Figure 1). Modern method use is defined as the baseline category as it is the largest response category. The probability of method choice is expressed as $\pi_{ij}^{(s)} = \Pr(y_{ij} = s)$ where $s=0, 1, 2$. The model may be presented as

$$\ln\left(\frac{\pi_{ij}^{(s)}}{\pi_{ij}^{(0)}}\right) = \boldsymbol{\beta}^{(s)T} \mathbf{x}_{ij} + v_j^{(s)}, \quad s = 1, 2, \quad (1)$$

where $\boldsymbol{\beta}^{(s)}$ is a vector of coefficients, \mathbf{x}_{ij} is a vector of explanatory variables including interaction effects and $v_j^{(s)}$ represents unobserved random PSU (area) effects. The area random effects \mathbf{v}_j are assumed to follow a bivariate normal distribution, such that $\mathbf{v}_j = (v_j^{(1)}, v_j^{(2)}) \sim N(0, \Omega)$, with Ω defined as

$$\Omega = \begin{bmatrix} \sigma^{2(1)} & \sigma^{(12)} \\ \sigma^{(12)} & \sigma^{2(2)} \end{bmatrix}, \quad (2)$$

where $\sigma^{2(1)}$ and $\sigma^{2(2)}$ denote PSU level variances for natural and no methods respectively, and $\sigma^{(12)}$ denotes the covariance between PSU effects on natural and no method use. A positive (negative) residual covariance is expected if areas that have high rates of natural methods use tend also to have high (low) rates of non-use. Equation (1) is referred to as a random intercept model because the effect of area j is to change the log-odds of natural or no method versus modern method use by $v_j^{(s)}$, regardless of the values $x_{ij}^{(s)}$. In the more general random slopes model, $\beta^{(s)}$ may vary randomly across PSUs.

Different specifications of the multilevel multinomial models were considered. First, a random intercept is specified (null model) without any covariates, and significance of the intercept is tested at $\alpha=5\%$. The main fixed effects are then added to the model using a forward stepwise selection procedure with 5% significance level. The explanatory variables are grouped according to research hypotheses relating to asset wealth, isolation, FP program effect and the controls (exposure to risk of pregnancy, fertility preference, and demographic variables). Asset wealth is an index constructed as a proxy for measuring economic status, based on principal component analysis (Filmer and Pritchett 2001). The same technique is applied to construct groups that represent the extent of FP media exposure. Interactions between significant main effects of age, education and region of residence with asset wealth, and FP impact variables are then added to the model. Interaction effects are limited to two-way interactions for simplicity. Tests for significant random slopes for the effect of asset wealth and FP program variables are conducted, to allow for random variation of the effect of these variables between PSUs. Area level variables representing the proportion of women who visited a clinic in the past year (measuring access), and the mean score of FP media exposure in the cluster (measuring social network influences identified by Kohler et al. 2001 and Montgomery and Casterline 1996) are tested for

significance. To ease interpretation of important main and interaction effects predicted probabilities are calculated.

Results

Descriptive analysis

Table 1 presents the distribution of explanatory variables within each type of method use (including a test for bivariate association) which were found significant in the final model. Women in the lowest wealth category have the highest use of natural methods, and the highest proportion of non-use. The proportion of women using a modern method rises with increasing economic status, while the proportion of women using no method falls considerably. The proportion of women using a natural method in rural areas is almost 10% points higher than in urban areas. Natural method use is the lowest in the capital region, Chisinau. Whether the respondent had been counselled at an FP clinic in the past 12 months was found to be non-significant. All variables related to FP program effect show a statistically significant association with method choice. Among women with low media exposure there is relatively high natural method use, although there is no monotonic decrease in natural method use with higher exposure. As expected, there is a fall in non-use and increase in modern method use with higher FP exposure. There is a substantial concentration of natural method use among women whose last contraceptive discontinuation was a natural method. Considering the influence of AIDS awareness, a striking result is that about 18% of respondents are unaware of the existence of AIDS or do not know how to prevent it. These women have a high proportion of women using either no or a natural method. Modern method use is the highest among women who knew how to prevent AIDS transmission.

Table 1 Percentage distribution of respondents by current use and selected characteristics, MDHS 2005

Variable	% of current users			No. of respondents
	Modern methods (n=2431)	Natural methods (n=1275)	No method (n=2154)	
Total	40.7	22.8	36.6	5860
Asset wealth category** (direct cost)				
Poor	35.6	24.7	39.7	2285
Medium	40.3	20.9	38.7	2140
Rich	50.2	22.2	27.7	1435
Access variables (opportunity cost)				
<u>Region**</u>				
North	38.9	25.8	35.2	1637
Center	37.5	25.4	37.1	1374
South	39.7	23.7	36.6	1132
Chisinau	46.8	15.6	37.7	1717
<u>Place of residence**</u>				
Urban	44.1	17.9	38.1	3442
Rural	38.0	26.6	35.4	2418
Family planning program				
<u>Exposure to family planning media**</u>				
Low	34.8	24.2	41.0	2440
Medium	44.1	20.9	35.0	1501
High	45.8	22.2	32.0	1919
<u>Respondent knows ways to avoid AIDS**</u>				
No	37.5	22.4	40.1	935
Yes	43.8	21.8	34.4	2133
Has not heard of AIDS	24.3	25.0	50.7	116
Unsure	40.1	23.5	36.4	2676
<u>Last method discontinued**</u>				
Modern	45.2	20.6	34.1	1576
Natural	41.9	27.2	30.9	871
No recorded discontinuation	38.3	22.6	39.1	3413
Demographic characteristics (control)				
<u>Age category**</u>				
15-24	38.4	22.9	38.6	1308
25-34	49.5	22.3	28.1	1737
35-49	36.2	23.0	40.9	2815
<u>Number of living children**</u>				
Nulliparous	27.7	14.6	57.7	1027
1	42.1	20.0	37.9	1650
2	46.6	24.7	28.7	2230
3+	37.6	30.3	32.0	953

Contd.

Table 1 Percentage distribution of respondents by current use and selected characteristics, MDHS 2005 (contd.)

Variable	% of current users			No. of respondents
	Modern methods (n=2431)	Natural methods (n=1275)	No method (n=2154)	
<u>Has had birth within past year?</u> **				
No	41.4	21.6	37.0	5511
Yes	28.2	41.4	30.5	349
<u>Highest educational level</u> **				
Less than secondary/unsure	^a 32.6	^a 23.9	^a 43.5	46
Secondary	39.1	23.4	37.5	4429
Higher	46.7	20.2	33.0	1385
<u>Ethnicity</u> *				
Moldovan	40.0	23.2	36.7	4462
Romanian	50.4	^a 15.7	33.9	127
Ukranian	42.7	21.5	35.8	489
Russian	43.9	18.2	38.0	374
Gagauzan	41.7	23.2	35.1	221
Bulgarian	35.0	33.3	31.7	120
Other	^a 35.9	^a 21.9	^a 42.2	64
Desire for future fertility** (control)				
Wants within 2 years	28.8	14.5	56.8	661
Wants after 2 years	50.1	23.5	26.4	786
Wants, unsure of timing	34.9	19.0	46.1	504
Undecided	44.7	22.4	32.9	182
Wants no more	44.2	26.1	29.7	3434
Can have no more	^a 6.2	^a 5.5	88.4	293
Exposure to coitus (control)				
<u>Current marital status</u> **				
Never married	32.0	14.9	53.2	481
Currently married	44.1	26.1	29.7	4716
Formally married	20.8	^a 3.1	76.1	663
<u>Recent sexual activity</u> **				
Active in last 4 weeks	47.2	27.6	25.2	4170
Not active/ Cannot remember	24.8	11.2	64.0	1690
<u>Fecundity</u> **				
Fecund	48.2	26.5	25.3	4673
Amenorrheic	25.8	35.7	38.5	209
Infecund, menopausal	9.1	3.0	87.9	978
Total	40.7	22.8	36.6	5860

** denotes $p < 0.01$; * denotes $p < 0.05$ in the χ^2 tests. ^a denotes a small cell count ($n < 30$). The row percentages may not sum to 100.0% due to rounding errors. Weighted data are used.

With regard to control variables, natural method use is found common among currently married, those sexually active in the last 4 weeks, amenorrheic women and those who do not wish to have no more children at the time of survey. Natural use is highest in the oldest age group. Women with high parities, those who had a recent birth experience, those had primary level schooling or below, those belonging to Roman Catholic religion and ethnic Bulgarians are likely to rely on natural methods. Literacy status and religion were non-significant due to small cell counts in some categories (results not shown separately).

Regression analysis

Area level random effects for both natural and non-use were significant at the 5% level in the null model (not presented). There was also a significant negative covariance term, indicating that areas with a high (low) proportion of women using no method also have a low (high) proportion of women using a natural method. Table 2 presents the estimates of the between area variance-covariance matrix for the final multilevel model. After controlling for all other explanatory variables in the model, the random intercepts for natural and non-use remain significant, but the covariance is no longer significant. Random slopes on key variables of wealth index and FP media exposure were not significant, which indicates that the coefficients for these variables do not vary between PSUs. The area level variables (proportion visiting a clinic and PSU mean FP media score) were also not significant.

Table 2 Estimated between area variance-covariance matrix of the final multilevel model for natural and non-use.

Parameter	Estimate	Standard error
Natural method, $v_j^{(1)}$	0.084 *	0.035
Non-use, $v_j^{(2)}$	0.015 *	0.009
Covariance, $\text{COV}(v_j^1, v_j^2)$	-0.027	0.019

Note: * denotes $p < 0.05$

Model estimated using 80000 MCMC samples with 5000 burn-in. Starting values for MCMC from 2nd order PQL (RIGLS).

Table 3 presents the estimated coefficients and standard errors of the explanatory variables included in the final multilevel model. To aid interpretation predicted probabilities are presented in Table 4 for important main effects. All categorical variables are set to their baseline category, except the variable ‘desire for future fertility’ which is set to the category ‘wants within the next 2 years’ in order to provide a better interpretation of non-use. Higher levels of wealth are associated with lower use of natural methods (Table 3). Natural use is therefore significantly higher for women from poorer background than for women in the highest wealth category. This finding is consistent with Carlson and Lamb (2003) and Serbanescu et al. (1995), and supports the research hypothesis that direct costs can influence the choice of contraceptive method. However, the predicted probabilities indicate that the size of this effect is small, with only a 5% point difference between poor and rich (Table 4). Richer women are also significantly less likely to be current non-users.

Table 3 Estimated coefficients with standard errors of the final multilevel model for natural method and non-use

Variable	Natural method		Non-use	
	$\hat{\beta}(1)$	Standard error	$\hat{\beta}(2)$	Standard error
<u>Intercept</u>	-0.796	0.167	-2.532	0.190
Asset wealth (ref.=Poor)				
Medium	-0.153	0.089	-0.050	0.094
Rich	-0.316 *	0.098	-0.240 *	0.112
Access variables (opportunity costs)				
† <u>Region of residence (ref.=Chisinau)</u>				
North	0.638 *	0.151	-0.056	0.154
Center (sic.)	0.396 *	0.160	0.040	0.166
South	0.277	0.176	-0.180	0.182
<u>Type of residence (ref.=Urban)</u>				
Rural	0.341 *	0.095	-0.053	0.104
Impact of family planning program				
† <u>Exposure to FP through media (ref.= Low)</u>				
Medium	-0.244	0.143	-0.049	0.161
High	-0.163	0.126	-0.027	0.146
† <u>Last contraceptive discontinued (ref.= No discontinuation within past 5 years)</u>				
Modern	-0.113	0.166	0.054	0.160
Natural	0.447 *	0.206	0.120	0.232
<u>Knows how to avoid AIDS (ref.= Yes)</u>				
No	0.110	0.112	0.459 *	0.120
Unsure	0.044	0.082	0.004	0.093
Has not heard of AIDS	0.116	0.297	0.751 *	0.327
Demographic characteristics (controls)				
† <u>Age category (ref= 35-49)</u>				
25-34	-0.514 *	0.145	-0.420 *	0.165
15-24	-0.302	0.188	0.121	0.196
<u>Parity (Number of living children, ref.=2)</u>				
Nulliparous	0.310	0.196	1.533 *	0.188
1	0.033	0.108	0.374 *	0.119
3 or more	0.194	0.106	0.029	0.134
<u>Has had birth in last year (ref.=No)</u>				
Yes	1.176 *	0.179	0.975 *	0.219
<u>Highest level of education (ref.= Secondary)</u>				
Less than secondary	-0.315	0.509	0.297	0.470
Higher	0.046	0.097	-0.329 *	0.104

Contd.

Table 3 Estimated coefficients with standard errors of the final multilevel model for natural method and non-use (contd.)

Variable	Natural method		Non-use	
	$\hat{\beta}(1)$	Standard error	$\hat{\beta}(2)$	Standard error
Ethnicity (ref.= 'Moldovan')				
Romanian	-0.329	0.266	0.025	0.274
Ukrainian	-0.078	0.139	-0.182	0.151
Russian	0.086	0.149	-0.253	0.156
Gagauzan	-0.018	0.213	0.176	0.226
Bulgarian	0.592 *	0.235	0.159	0.284
Other	0.238	0.368	0.318	0.375
Exposure to risk of pregnancy (controls)				
Fecundity (ref.= fecund)				
Amenorrheic	0.266	0.288	1.125 *	0.255
Infecund, menopausal	-0.891 *	0.235	3.979 *	0.149
Marital Status (ref.=currently married)				
Never Married	-0.358	0.214	0.717 *	0.182
Formerly married	-1.112 *	0.236	1.877 *	0.135
Has been active within last 4 weeks (ref.=Yes)				
No/Unsure	-0.288 *	0.108	1.654 *	0.097
Desire for future fertility (ref.=Wants no more, control variable)				
Wants within 2 years	0.086	0.160	1.614 *	0.153
Wants, 2+ years	-0.038	0.137	-0.090	0.155
Wants, unsure of timing	0.292	0.183	0.197	0.178
Undecided	0.122	0.219	0.119	0.239
Can have no more	0.869 *	0.348	2.567 *	0.293
Interactions				
Age x Exposure to FP media				
25-34 x Medium	0.057	0.221	-0.161	0.246
25-34 x High	0.111	0.195	-0.213	0.228
15-24 x Medium	0.089	0.237	-0.504 *	0.243
15-24 x High	-0.226	0.225	-0.883 *	0.234
Region x Last contraceptive method discontinued				
North x Modern	-0.207	0.231	0.326	0.241
Center x Modern	0.078	0.241	0.472	0.253
South x Modern	-0.097	0.258	0.867 *	0.257
North x Natural	-0.754 *	0.279	0.714 *	0.319
Center x Natural	-0.303	0.288	0.703 *	0.330
South x Natural	-0.231	0.300	0.725 *	0.348

† denotes involvement in 2-way interaction; *denotes significance at 5% significance; Model estimated using 80000 MCMC samples with 5000 burn-in. Starting values for MCMC from 2nd order PQL (RIGLS).

Table 4 Predicted probabilities of method choice for selected main term effects

Variable	Modern	Natural	Non-use
<u>Wealth</u>			
Low	0.53	0.26	0.21
Medium	0.56	0.23	0.21
Rich	0.60	0.21	0.19
<u>Type of residence</u>			
Urban	0.53	0.26	0.21
Rural	0.48	0.33	0.18
<u>Respondent knows how to prevent AIDS</u>			
Yes	0.53	0.26	0.21
No	0.46	0.25	0.29
Unsure	0.52	0.27	0.21
Has not heard of AIDS	0.42	0.23	0.35

Women in rural areas are significantly more likely to use a natural method than women in urban areas (Table 3) and the effect is of the order of 27% (Table 4). Probability of modern method use is relatively lower in rural areas. In a model without interaction effects (results not shown), natural method use was significantly higher in the northern and central regions compared to Chisinau, and use was higher in the South albeit not significant. In the final model, the interaction effect between region and the last contraceptive discontinued was significant. This interaction is indicative of potential regional effects on switching behaviour. The predicted probabilities of method use by region and last contraceptive discontinued are graphically illustrated in Figure 2. The probability of modern method use is higher in Chisinau than all other regions, regardless of last method discontinued. Natural method use is higher in all regions outside of Chisinau given both ‘no discontinuation’ and ‘modern method discontinuation’. The high probability of natural method use in Chisinau given a previous natural method discontinuation is attributed to a high overall contraceptive use in this region. The higher probability of natural method use in rural areas and in regions outside Chisinau suggests possible increased opportunity costs in poorly serviced regions and that access to clinic or

commercial source of modern method may dissuade women from modern method use and increase the probability of natural contraceptive use.

The impact of FP programs in Moldova is evaluated by examining the effect of FP media exposure, switching behaviour and AIDS awareness. The effect of FP media exposure is dependent on the age of the respondent. Table 5 presents the predicted probabilities of natural method use by category of FP media exposure. Overall, older women are more likely to use natural methods than younger women, for all levels of FP exposure. For women aged 15-24, the probability of using a natural method is lower with higher exposure to FP media, with the difference in probability of natural method use between low and high exposure of 6% points- indicating that FP programs have the desired effect on the use of natural methods amongst young women. This effect attenuates for the higher age categories. For the age group 35-49, the difference between the high and low exposure categories is 3% points- a smaller difference than for the younger age group. Further, the predicted probability of natural method use is higher among women with a high exposure than a medium exposure. Therefore, although high exposure to FP media reduces the probability of natural method use among younger women, the effect is not observed for older women.

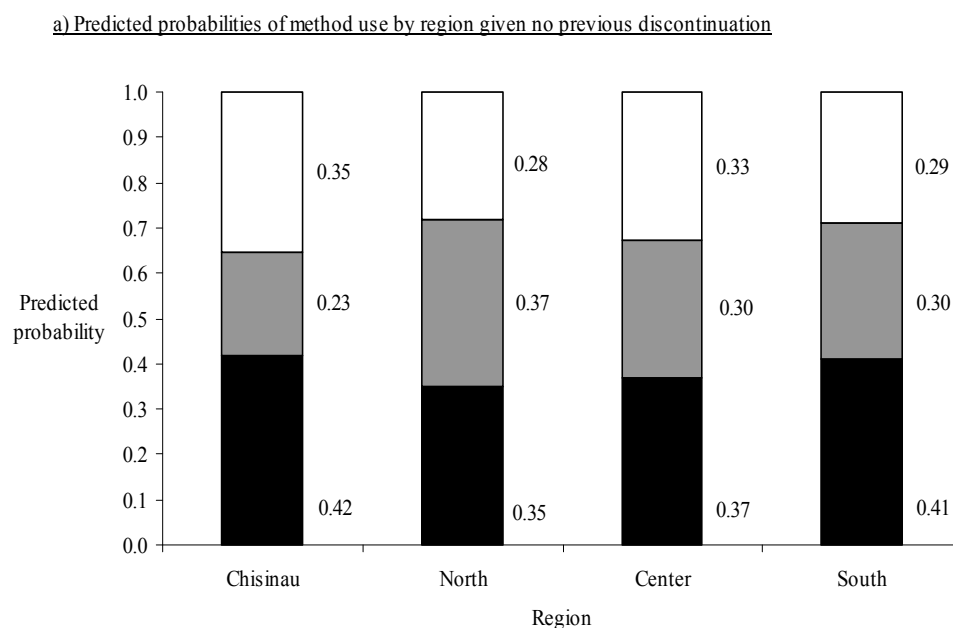
Table 5 Predicted probabilities of natural method use by category of FP media exposure for all age groups

FP media exposure	15-24	25-34	35-49
Low exposure	0.23	0.20	0.29
Medium exposure	0.21	0.18	0.25
High exposure	0.18	0.20	0.26

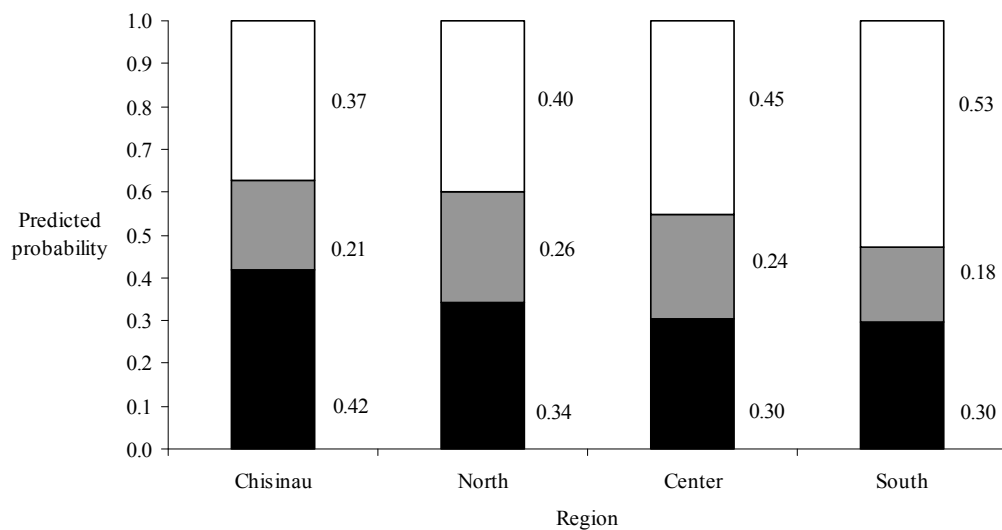
The last contraceptive method discontinued has a significant effect on current method choice indicating the importance of past switching behaviour. As noted earlier, the

effect of last contraceptive discontinued is dependent on region of residence (Figure 2). For all regions outside of Chisinau, the probability of natural method use is the highest among women who reported no discontinuation within the previous 5 years contrary to the expectation of higher natural method use among women who had discontinued a natural method (Trussel and Kost 1993). Regardless of region, women reporting either a natural or modern discontinuation have a high probability of current non-use. This indicates that the majority of contraceptive discontinuation is followed by non-use, rather than method switching. For women who have discontinued a natural method, the probability of modern method use is relatively lower in the North, Central and South regions when compared to Chisinau. This indicates that contraceptive switching from a natural to a modern method is least common outside of Chisinau. The probability of current natural method use given a previous modern method discontinuation is low in all regions, particularly in Chisinau and the South which suggests that switching from modern to natural methods tend to be rare.

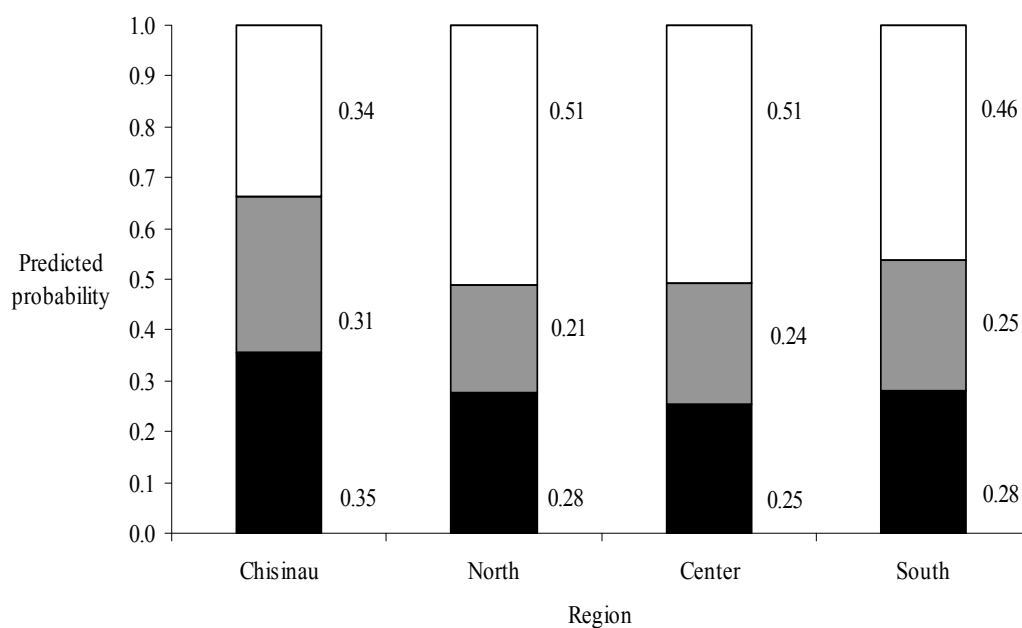
Figure 2 Predicted probabilities of method use by region given a) no discontinuation, b) modern discontinuation and c) natural discontinuation






b) Predicted probabilities of method use by region given modern method discontinuation



c) Predicted probabilities of method use by region given natural method discontinuation



 Denotes modern method use
 Denotes natural method use
 Denotes non-use

After controlling for all other variables, the level of AIDS awareness is not significant in explaining the use of natural contraceptive methods. We find no supporting evidence for the hypothesis that probability of natural method use falls with greater AIDS awareness. The effect of AIDS awareness does have a significant effect on non-use. Women who were aware of how to prevent AIDS have the highest probability of modern method use. In contrast, women who have not heard of AIDS are significantly more likely to use no method (Table 3), and have the highest predicted probability of non-use (Table 4). These results are consistent with the hypothesized association between AIDS awareness and greater modern method use and highlight that low awareness is associated with a greater risk of AIDS transmission due to non-use.

With respect to other control variables, the probability of natural or non-use tends to be lower at younger ages (Table 3). These results are consistent with the findings reported by Robinson (1996) and Westoff (2005). Considering the effect of the number of living children, nulliparous women are most likely to use a natural method- although the effect is non-significant. This is consistent with the findings reported by Magadi and Curtis (2003). There is also a high natural method use among women with three or more children. Nulliparous women and those with parity one are considerably more likely to use no method, indicating high modern contraceptive use among higher parity women. Those who have had a birth within the past year are significantly more likely to use a natural method compared to women with no recent birth (Table 3). This might be attributed to the use of natural Lactational Amenorrheic Method associated with breastfeeding in the postpartum period (Kennedy and Trussel 2004). The probability of natural method use increases with higher levels of education, when compared to women with secondary education, as those with higher education

are more likely to be natural method users. This effect is reversed for non-use, perhaps indicating an increase of overall contraceptive use among women with higher education levels. Although ethnicity is significant in the model, the only significant category is the Bulgarians who are more likely to use natural methods than the Moldovan counterparts.

Unsurprisingly, women with a low risk of pregnancy (depending on their fecundity, reported sexual activity and marital status) tend to have a lower probability of natural method use, and higher probability of non-use. Also, women who want a birth within the next 2 years are substantially more likely to use no method, while natural and non-use is significantly higher among women who believe they can have no more children.

Conclusions and policy recommendations

The foregoing analysis confirmed our hypotheses that economic disadvantage and spatial isolation have a positive impact on high natural method use in Moldova whereas higher FP media exposure has a negative impact on natural method use, although the effect is attenuated considerably by women's age. Natural method use is also greater among women in rural areas and those residing in areas outside the capital, Chisinau. The findings suggest that women in Moldova are reluctant to switch from a natural to modern contraceptive in almost all geographical regions outside Chisinau. The present analysis did not find an effect of HIV/AIDS awareness on natural method use but shows a positive effect on modern method use. Natural method use is greater among older women, and among nulliparous women and high parity women. Women who had a birth within the past year were significantly more likely to use a natural contraceptive and there is high natural method use among

women with higher education attainment. Furthermore, this study shows that the correlates of natural method use is different from those of non-use.

Three main policy recommendations are identified. We found that current FP media exposure does not seem to have an effect on reducing natural method use among older women. Since many of these women may rely on induced abortion to prevent subsequent births (Westoff 2005, Agadjanian 2002), this result may highlight possibilities for better targeting of FP programs. By directing effort to increase modern method use for older age groups, FP programs could have a substantial impact in reducing both unwanted fertility and demand for induced abortion. The study found that switching behaviour varied by region of residence- perhaps indicative of the impact of variations in service provision. Given that nearly 40% of births in Moldova are unwanted, mostly due to (natural) method failure (Westoff 2005), policy interventions could particularly target women who have experienced natural method failure to adopt a modern method (Bruce 1990). Finally, although NPAIDS demonstrates the effect of increasing modern contraceptive use, about 1 in 5 women are either unaware of AIDS or unaware of how to avoid AIDS infection. These women are significantly more likely to be non-users, and hence have no protection from HIV/AIDS. The NPAIDS therefore needs to increase efforts to ensure that women at risk of HIV/AIDS receive adequate information to protect themselves from infections. This study concludes that FP efforts directed toward the poorest may have limited impact overall, but interventions targeted at older women could reduce levels of unwanted births and abortions.

There are a few data limitations in this study that are worth noting. First, the DHS records only one contraceptive method (current use) per woman. Where more than one contraceptive is in use the most effective method is recorded, leading to

potential underreporting of natural method use (Rogow and Horowitz 1995). Second, no causal assertions can be made from this study due to the cross-sectional nature of the DHS data. For example, it cannot be determined whether the modern method use results from FP media exposure or whether modern method users are more exposed to FP media at the source of their method. Third, the data cannot provide any insight into the decision making process and the rationalisation of contraceptive choice, it can only summarise reported behaviour. Despite these limitations, the present study clearly shows the importance of promoting effective modern methods especially targeting poor and vulnerable women who continue to bear the burden of unwanted pregnancies and induced abortions.

Acknowledgements

The authors would like to thank the UK Economic and Social Research Council for providing financial support (PTA-031-2006-00188)

References

Agadjanian, V. (2002). "Is "Abortion Culture" Fading in the Former Soviet Union? views about Abortion and Contraception in Kazakhstan." Studies in Family Planning **33**(3): 237-248.

Bruce, J. (1990). "Fundamental Elements of the Quality of Care: A Simple Framework." Studies in Family Planning **21**(2): 61-91.

Carlson, E., Lamb, V. (2001). "Changes in Contraceptive Use in Bulgaria, 1995-2000." Studies in Family Planning **32**(4): 329-338.

Easterlin, R. A. (1979). "An Economic Framework for Fertility Analysis." Studies in Family Planning **6**(3): 54-63.

Filmer, D., Pritchett, L.H. (2001). "Estimating Wealth Effects without Expenditure Data- or Tears: An Application to Educational Enrolments in States of India." Demography **38**(1): 115-132.

Goldburg, H. I., Toros, A., (1994). "The Use of Traditional Methods of Contraception among Turkish Couples." Studies in Family Planning **25**(2): 122-128.

Kennedy and Trussel. (2004). Postpartum Contraception and Lactation in Contraceptive Technology. R. Hatcher, Trussel, J., Stewart, F., Nelson, A.L., Cates, W., Guest, F., Kowal, D. New York, Ardent Media. **18**.

Kohler, H., Behrman, J.R., Watkins, S.C. (2001). "The Density of Social Networks and Fertility Decisions: Evidence from South Nyanza District, Kenya." Demography **38**(1): 43-58.

Kost, K. (1993). "The Dynamics of Contraceptive use in Peru." Studies in Family Planning **24**(2): 109-119.

Kowal, D. (2004). Coitus Interruptus (Withdrawal). in Contraceptive Technology. R. Hatcher, Trussel, J., Stewart, F., Nelson, A.L., Cates, W., Guest, F., Kowal, D. New York, Ardent Media. **18**.

- Lindstrom, D. P., Munoz-Franco, E. (2005). "Migration and the Diffusion of Modern Contraceptive Knowledge and Use in Rural Guatemala." Studies in Family Planning **36**(4): 277-288.
- Magadi, M. A., Curtis, S.L. (2003). "Trends and Determinants of Contraceptive Method Choice in Kenya." Studies in Family Planning **34**(3): 149-159.
- Montgomery, M. R., Casterline, J.B. (1996). "Social Learning, Social Influence and New Models of Fertility." Population and Development Review **22** (Supplement: Fertility in the United States: New Patterns, New Theories): 151-175.
- NCPM and ORC Macro. (2006). *Moldova Demographic and Health Survey 2005*. Calverton, Maryland: National Scientific and Applied Center for Preventive Medicine of the Ministry of Health and Social Protection, Republic of Moldova and ORC Macro.
- Pariani, S., Heer, D.M., Van Arsdol Jr., M.D., (1991). "Does Choice Make a Difference to Contraceptive Use? Evidence from East Java." Studies in Family Planning **22**(6): 384-390.
- Robinson, K. M. (1996). Education and Traditional Contraceptive Use: An Analysis of Nine Countries Using Demographic and Health Survey Data, Centre for Global Initiatives: University of North Carolina, Chapel Hill.
- Rogow, D., Horowitz, S., (1995). "Withdrawal: A review of the Literature and an Agenda for Research." Studies in Family Planning **26**(3): 140-153.
- Santow, G. (1993). "Coitus Interruptus in the Twentieth Century." Population and Development Review **19**(4): 767-792.
- Santow, G. (1995). "Coitus Interruptus and the Control of Natural Fertility." Population Studies **49**(1): 19-43.
- Serbanescu, F., Morris, L., Stupp, P., Stanescu, A. (1995). "The Impact of Recent Policy Changes on Fertility, Abortion, and Contraceptive Use in Romania." Studies in Family Planning **26**(2): 76-87.

Sobotka, T. (2003). "Re-Emerging Diversity: Rapid Fertility Changes in Central and Eastern Europe after the Collapse of the Communist Regimes." Population (English Edition, 2002-) **58**(4/5): 451-485.

Swar-Eldahab, A. M. (1993). "Constraints on Effective Family Planning in Urban Sudan." Studies in Family Planning **24**(6): 366-374.

United Nations. (2007). World Contraceptive Use 2007
available at:
<http://www.un.org/esa/population/publications/contraceptive2007/contraceptive2007.htm>
accessed (23/10/08)

Westoff, C. (2000). The Substitution of Contraception for Abortion in Kazakhstan in the 1990s. DHS Analytical Studies No 1. Calverton, Maryland: ORC Macro.

Westoff, C. (2005) Recent Trends in Abortion and Contraception in 12 Countries. DHS analytical studies No 8. Calverton Maryland, ORC Macro.