



H N P D I S C U S S I O N P A P E R

Economics of Tobacco Control Paper No. 30

Smoking and Its Consequences in Pregnant Women in Ukraine

Tatiana I. Andreeva, Elizabeth Gilpin, Tetyana O. Salyuk, Konstantin S. Krasovsky
and Anna V. Dovbakh

August 2005

Tobacco Free Initiative
World Health Organization



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SMOKING AND ITS CONSEQUENCES IN PREGNANT WOMEN IN
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Abstract: Smoking during pregnancy increases the risk of a number of complications of pregnancy and can have adverse effects on the child. This study provides data from Ukraine that are consistent with the international literature on the effects of smoking during pregnancy. The study of nearly 700 women in Ukraine examined the rate of smoking during pregnancy and factors related to continued smoking. It documents the outcomes of pregnancy in women who smoked prior to pregnancy, and who smoked during pregnancy compared to those who did not. It also looks at pregnancy outcomes with respect to the baby's father smoking. Smoking during pregnancy is at low levels in Ukraine (<5% of pregnant women), but is associated with family structure, the baby's father smoking, and the number of previous abortions. It is also associated with placental insufficiency, low birth weight, fetus hypotrophy, and hip joint dysphasia. The father's smoking is associated with decreased fertility, late toxicosis, miscarriage threat in third trimester, small baby, and lower infant functional status. There was no evidence that information on the dangers of smoking while pregnant encouraged cessation.

Keywords: tobacco, smoking, secondhand smoke, environmental tobacco smoke, cigarettes, cessation, quitting, pregnancy, fetus, birth outcomes, adverse outcomes, placental insufficiency, low birth weight, fetus hypotrophy, toxicosis, miscarriage, low infant functional status

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FOREWORD

In 1999, the World Bank published “Curbing the Epidemic: governments and the economics of tobacco control”, which summarizes the trends in global tobacco use and the resulting immense and growing burden of disease and premature death. By 1999, there were already 4 million deaths from tobacco each year, and this huge number is projected to grow to 10 million per year by 2030, given present trends in tobacco consumption. Already about half of these deaths are in high-income countries, but recent and continued increases in tobacco use in the developing world is causing the tobacco-related burden to shift increasingly to low- and middle-income countries. By 2030, seven of every ten tobacco-attributable deaths will be in developing countries. “Curbing the Epidemic” also summarizes the evidence on the set of policies and interventions that have proved to be effective and cost-effective in reducing tobacco use, in countries around the world.

Tax increases that raise the price of tobacco products are the most powerful policy tool to reduce tobacco use, and the single most cost-effective intervention. They are also the most effective intervention to persuade young people to quit or not to start smoking. This is because young people, like others with low incomes, tend to be highly sensitive to price increases.

Why are these proven cost effective tobacco control measures –especially tax increases– not adopted or implemented more strongly by governments? Many governments hesitate to act decisively to reduce tobacco use, because they fear that tax increases and other tobacco control measures might harm the economy, by reducing the economic benefits their country gains from growing, processing, manufacturing, exporting and taxing tobacco. The argument that “tobacco contributes revenues, jobs and incomes” is a formidable barrier to tobacco control in many countries. Are these fears supported by the facts?

In fact, these fears turn out to be largely unfounded, when the data and evidence on the economics of tobacco and tobacco control are examined. The team of about 30 internationally recognized experts in economics, epidemiology and other relevant disciplines who contributed to the analysis presented in “Curbing the Epidemic” reviewed a large body of existing evidence, and concluded strongly that in most countries, tobacco control would not lead to a net loss of jobs and could, in many circumstances actually generate new jobs. Tax increases would increase (not decrease) total tax revenues, even if cigarette smuggling increased to some extent. Furthermore, the evidence show that cigarette smuggling is caused at least as much by general corruption as by high tobacco product tax and price differentials, and the team recommended strongly that governments not forego the benefits of tobacco tax increases because they feared the possible impact on smuggling, but rather act to deter, detect and punish smuggling.

Much of the evidence presented and summarized in “Curbing the Epidemic” was from high income countries. But the main battleground against tobacco use is now in low- and middle-income countries. If needless disease and millions of premature deaths are to be prevented, then it is crucial that developing countries raise tobacco taxes, introduce comprehensive bans on all advertising and promotion of tobacco products, ban smoking in public places, inform their citizens well about the harm that tobacco causes and the benefits of quitting, and provide advice and support to help people who smoke and chew tobacco, to quit.

In talking to policy-makers in developing countries, it became clear that there was a great need for country-specific analytic work, to provide a basis for policy making, within a sound economic framework. So the World Bank and the Tobacco Free Initiative of the World Health Organization (as well as some of the WHO regional offices and several other organizations, acting in partnership or independently) began to commission and support analysis of the economics of tobacco and tobacco control in many countries around the world.

The report presented in this Economic of Tobacco Discussion Paper makes a valuable contribution to our understanding of the issues and likely economic impact of tobacco control in a specific country setting. Our hope is that the information, analysis and recommendations will prove helpful to policy makers, and help result in stronger policies to reduce the unnecessary harm caused by tobacco use.

Joy de Beyer

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INTRODUCTION

The importance of smoke-free environments for a developing fetus and for children is widely recognized. Many authors have shown multiple adverse effects of future parents' smoking on pregnancy outcomes, including the health of babies and children (Andres and Day, 2000; Brook, Brook and Whiteman, 2000; Cornelius, Leech, Goldschmidt and Day, 2000; Haustein, 1999; Kallen, 2000a; Kallen, 2000b; Landau, 2001; Pastrakuljic, Derewlany and Koren, 1999).

Pregnancy influences smoking patterns and is an opportune time for the promotion of a smoke-free environment (Ford, Wild, Glen, Price and Wilson, 1993). Many studies in different countries have examined the possible predictors of smoking cessation during or prior to pregnancy. Most conclude that the mothers' education, age, parity (O'Campo, Faden, Brown and Gielen, 1992) and number of cigarettes smoked are the best predictors of smoking cessation prior to or during pregnancy (Eriksson et al., 1998; Jane et al., 2000; Madeley, Gillies, Power and Symonds, 1989). However, living with a smoking partner and other socio-economic characteristics are often found to predict continuation of smoking during pregnancy. A number of papers describe methods for promoting smoking cessation in pregnancy and the preconditions for their effectiveness (Carrion, Maya, Pont, Tortajada and Marin, 2003; Lawrence, Aveyard, Evans, and Cheng, 2003).

Although the problem is well recognized by the international medical community, the situation in developing and transitional countries such as Ukraine is complicated by such factors as: (1) tobacco industry intensive targeting of young women, which results in growing smoking prevalence in this group, and (2) lack of intervention skills for smoking cessation among health professionals.

The objectives of this study were: (1) to determine factors influencing smoking cessation or continuation of smoking by pregnant women, (2) to identify health problems for the mother and baby related to smoking, and (3) to develop recommendations which could increase cessation rates among mothers-to-be.

METHODS

Data sources

The study involved two sources of data. Primary data were collected at prenatal care institutions in Kiev city using in-person structured interviews with pregnant women during routine prenatal visits. Altogether, 698 pregnant women aged 14-40 years of age volunteered to participate. Most women responded positively and were interested in a conversation with the interviewers on issues of lifestyle and its effect on fetal health after the interview. Birth outcome data were then collected from hospital records for as many participants as possible.

Primary data

Primary data consisted of the following blocks of information.

1. Previous pregnancy data: births, abortions, miscarriages, complications of previous pregnancies and deliveries.
2. Reproductive health problems, diseases of female reproductive organs.
3. Course and complications of current pregnancy (prior to interview).
4. Family structure: other relatives in household.
5. Alcohol use by the woman before pregnancy, by other family members, by pregnant woman and father in different periods before and during pregnancy, types and quantity of alcoholic drinks, expenses.
6. Smoking by woman before and during pregnancy, smoking by the father, and by other family members, expenses.
7. Environmental tobacco smoke (ETS) exposure of pregnant woman.
8. Coffee use in the family, by woman and father in different periods before and during pregnancy.
9. Illegal drug use by woman and father in different periods before and during pregnancy.
10. Communication with prenatal care staff (prior to interview) on coffee, tobacco, alcohol and illegal drugs use.
11. Sources and sufficiency of information on substance use impact on the mother and baby health (prior to interview).
12. Family budget and its distribution.
13. Medicines taken in pregnancy (prior to interview).
14. Woman's knowledge of consequences of alcohol use, active and passive smoking, coffee use on their baby's health.

From the information provided by the pregnant women, three different groups were defined in terms of their own smoking status. The largest group (Group 1, 419 women, 60% of sample) included 'nonsmokers'; these women reported no smoking ever, either before or during their present pregnancy. The second largest group (Group 2, 247 women, 35.4%) consisted of 'former smokers.' Overall, these two groups comprised 95% of pregnant women interviewed. Altogether, seven of every eight pregnant women who smoked before pregnancy had stopped smoking by the time of the interview. The third group (Group 3, 32 women, 4.6%) included 'regular smokers' at the time of the interview.

Birth outcome data

Although all hospitals with obstetric departments in Kiev that might have been the delivery site for the women in the study were visited, birth record data were obtained for only 244 out of 698 primary sample participants. The following blocks of information were abstracted from the hospital records.

1. Personal data: to match prenatal and hospital records, included age, number and time of previous pregnancies.
2. Diagnosis: term of pregnancy, number of pregnancy and delivery, complications.

3. Course of delivery: time of certain events within delivery.
4. Physical and functional status of the baby.
5. Complications and pathological states of the baby (hypotrophy, immaturity, cephalohematoma, cord entanglement, large fetus, dysplasia of the hip joint).
6. Complications and pathological states concerning the mother (bleeding, traumatism)
7. Obstetric interventions used.
8. Medical problems before and during pregnancy.

A detailed comparison of women whose birth records were and were not obtained is presented in the Appendix. In brief, there was no indication that these groups differed with respect to tobacco, alcohol, coffee or illegal drug use, reproductive health, income or family structure.

Data analysis

Data were processed using SPSS for Windows, Release 10.0.5 Standard version. The analyses presented were the results of binary logistic regressions, ANOVA comparisons of sub-group means for continuous/ordinal variables, and chi-square or Fisher's exact tests for categorical variables.

RESULTS

Sample characteristics

Trimester and course of current pregnancy

Most of the women were interviewed during their third trimester of pregnancy (Table 1), and thus, if smokers, would have had time to quit if they intended and were able to.

Table 1: Distribution by trimester of pregnancy at time of interview

	Frequency	Percent
1 st trimester	39	5.6
2 nd trimester	242	34.7
3 rd trimester	417	59.7
Total	698	100.0

Hospital records revealed higher rates of complications with respect to the present pregnancy than were reported by the women themselves during the interview (Table 2). While it is possible that some of these complications developed after the interview, the high rates of miscarriage threat, anemia and toxicosis among those with birth records available suggests that many women were not made aware of factors affecting the course of their pregnancy.

Table 2: Course and complications of the current pregnancy

Complication or problem	Self-reported N=698		Medically registered N=244	
	Frequency	Percent	Frequency	Percent
Miscarriage threat	111	15.9	108	48.2
Anemia	47	6.7	119	48.8
Toxicosis	31	4.4	70	28.7
Early toxicosis			34	13.9
Late toxicosis			36	14.8
Placental disorders	13	1.9	11	4.5
Placental insufficiency			28	11.5
Low placentation	7	1.0	8	3.3
Oligohydramnios			16	6.6
Hydramnion	1	0.1	7	3.0
Pathological weight gain			28	11.5
ABO-isosensibilization			43	17.6

Reproductive history

Tables 3 and 4 present various factors related to reproductive history. For the majority of the women (439 or 62.9%), the pregnancy of the interview was their first, and 151 (21.6%) had had a previous full-term pregnancy. Around 14% had had a previous abortion, and about 8% had had a previous miscarriage. We include a measure of fertility, which is the number of months of unprotected sex previous to the current pregnancy.

Table 3: Reproductive history of women in study

	N	Min	Max	Mean	SD
Age of woman when interviewed	698	14	40	25.09	4.43
Week of pregnancy when interviewed	694	3.0	40.0	28.09	7.89
Number of pregnancy	698	1	11	1.65	1.17
Number of abortions	698	0	8	0.31	0.87
Year of first abortion	104	1987	2003	1997.31	3.49
Year of last abortion	100	1989	2003	1998.42	3.08
Number of deliveries	698	0	3	0.24	0.48
Year of first delivery	147	1984	2002	1995.12	3.75
Year of the previous delivery	145	1984	2002	1995.46	3.82
Number of miscarriages	698	0	4	0.11	0.41
Year of first miscarriage	58	1986	2003	1998.38	4.00
Year of last miscarriage	57	1986	2003	1999.02	3.38
Months of unprotected sex before the conception (fertility)	698	0.00	120.00	8.04	14.96
Number of children	696	0	3	0.23	0.48

Table 4: Course and self-reported complications of previous full-term pregnancies (N=148)

	Frequency	Percent
Self-reported threat of miscarriage	22	14.9%
Preterm deliveries	6	4.1%
Caesarean section	10	6.8%
Intrauterine deaths	13	8.8%

Altogether, 191 (27.4%) of women reported a history of disease of the female reproductive organs. Cervical erosion was the problem most frequently reported (n=84, 12.0%), followed by chronic adnexitis (n=76, 10.9%), and candidosis (n=28, 4.0%). No other reproductive organ disease was reported by more than 16 women.

Smoking status and ETS exposure

Overall, 279 (40%) of the pregnant women in the sample had smoked before their current pregnancy, but only 32 (4.6% of the sample, or 11% of prior smokers) were smoking by the time of the interview (Table 5). However, smoking rates were high for the baby's father and other family members.

Table 5: Smoking among pregnant women and people around them

	Frequency	Percent
Woman smoked before pregnancy	279	40.0
Woman smoked at time of interview	32	4.6
Baby's father smokes	395	56.8
Family members smoke	161	23.1
ETS exposure		
- in the whole sample	261	38.1
- in never smokers or those who had quit by interview	236	36.1
- in never smokers	121	29.4

A woman was more likely to have smoked before her pregnancy if there were smokers in her social environment (Table 6). Further, the likelihood of smoking during the pregnancy was much higher if the baby's father smoked compared to if he didn't smoke, other family members smoked compared to if they did not, and if other people in the environment smoked compared to if they did not.

Table 6: Odds ratios (95% confidence intervals) from univariate logistic regressions for the association between pregnant women smoking and other people smoking

	Smoking before pregnancy	Smoking during pregnancy
	N=247	N=32
Baby's father smokes	2.705 (1.960-3.734) p<0.001	7.871 (2.374-26.092) p<0.001
Other family members smoke	2.201 (1.539-3.149) p<0.001	3.593 (1.754-7.359) p=0.001
Other people around her smoke	2.486 (1.808-3.418) p<0.001	6.311 (2.689-14.812) p<0.001

Nearly 50% of the pregnant women reported exposure to ETS, if the baby’s father or other family members were smokers, compared to only about 30% if these relatives did not smoke.

Smoking and socio-economic status

Smoking by the woman either before or during pregnancy was not associated with income level (Table 7). Quartile 1 is the lowest income level. While the baby’s father’s smoking prevalence was related to income level (more smoking with lower incomes), this was not observed for other family members or other people in the social environment. Not surprisingly, the more affluent spent proportionately less of their income on cigarettes than those of more modest means.

Table 7: Family budget and smoking

	Distribution by family budget quartile				
	1 st quart	2 nd quart	3 rd quart	4 th quart	P
Woman smoked before pregnancy	41.1%	33.6%	34.7%	40.5%	0.563
Woman smoked at interview	5.3%	5.6%	3.2%	6.3%	0.730
Baby’s father smokes	74.7%	57.0%	58.5%	46.8%	0.001
Other family members smoke	20.0%	24.1%	20.2%	21.6%	0.877
Other people around her smoke	45.7%	35.8%	38.3%	32.4%	0.254
Percent of budget spent on tobacco	8.0%	4.5%	3.3%	1.5%	0.000

These results suggest that smoking prevalence among females of reproductive age has stabilized recently in Ukraine. Our 2000 survey showed a higher smoking prevalence among more educated women (presumably in families with higher incomes) (Krasovsky, Andreeva, Krisanov, Mashliakivsky and Rud, 2002). In the present study, smoking prevalence among fathers (males of reproductive age) varied from around 45-50% in more affluent social groups to between 70-75% in poorer groups.

Comparison of groups of women according to smoking status

Table 8 compares never smokers, former smokers at the time of the interview, and current smokers when interviewed according to selected important primary variables. At least marginal differences were found among the three groups for all of these factors. The pattern observed indicates that former smokers were more likely to report factors that could negatively affect their health or that of their baby than never smokers and that continuing smokers showed even more of the behavior than former smokers. For instance, alcohol consumption in the first month of pregnancy among never smokers was much lower than among former smokers, and for former smokers it was lower than for those still smoking when interviewed. The rate of the father smoking increased from under 50% for the never smokers to 90% for women who still smoked. Use of iron supplements showed a reverse pattern with use being much more common among the never smokers. Smoking is apparently indicative of a life-style and social setting that is different from that experienced by never smokers.

Table 8: Comparison of groups of women by smoking status

(Top portion of table shows results for continuous or ordinal variables, and lower portion for discrete variables)

Continuous/Ordinal Variables	ANOVA		Never smoked		Quit before pregnancy or prior to interview		Smoked at interview	
	F	P*	N=419		N=247		N=32	
			mean	SD	mean	SD	mean	SD
Age of mother	2.724	0.066	25.41	4.29	24.66	4.52	24.31	5.30
Week of pregnancy	3.193	0.042	28.27	7.59	28.22	7.96	24.66	10.24
Number of pregnancy	7.566	0.001	1.58	1.10	1.68	1.13	2.41	1.88
Number prior abortions	12.106	0.000	0.24	0.74	0.34	0.87	1.00	1.72
Number of older relatives in household	5.309	0.005	0.74	0.95	0.80	0.96	1.31	1.06
Alcohol (month before pregnancy)	10.610	0.000	32.88	76.75	107.04	311.13	115.23	168.45
Alcohol (first month of pregnancy)	13.118	0.000	11.93	39.31	29.47	81.20	61.67	107.32
Coffee (month before pregnancy)	16.145	0.000	0.83	1.67	1.10	1.49	2.58	2.81
Coffee (first month of pregnancy)	12.104	0.000	0.51	1.27	0.64	1.04	1.66	2.26
Chi-Square Analysis								
Discrete Variables	Chi-square	P	n	%	n	%	n	%
Father smokes	44.028	0.000	197	42.2	169	68.4	29	90.6
Other relatives in household smoke	31.738	0.000	73	17.7	72	29.5	16	50.0
Others in social environment smoke	42.978	0.000	122	29.6	114	47.3	25	78.1
Mother used illegal drugs prior to pregnancy	12.150	0.002	1	0.2	4	1.6	2	6.3
Used iron supplements during pregnancy	5.556	0.062	99	23.6	51	20.6	2	6.3

*P-values are rounded to three significant figures.

Factors associated with continued smoking during pregnancy

The results of logistic regressions of factors which might influence smoking cessation before or during pregnancy are presented in Table 9. The analyses were carried out for the 279 women who reported smoking before pregnancy, 32 of whom still smoked when interviewed. Because of the relatively small number in this group, only a limited number of variables can be included in a multivariate analysis, so a series of separate analyses examine each variable with two control variables in the model (mother's age at interview and week of pregnancy at interview). The results in the table for mother's age and pregnancy duration at interview are from a model with only these two factors included. The odds of cessation increased by 1.087 with each year of age, and by 1.078 with each week of pregnancy completed by the interview.

Having older relatives in the household was highly related to continued smoking. Interestingly, the smoking status of these older relatives was not significantly related to continued smoking by the expectant mother when controlling for the mother's age and duration of pregnancy. If the baby's father smoked or did not live with the mother, she was more likely to be a continuing smoker. Alcohol and coffee consumption were significantly related to continued smoking. Compared to having one prior pregnancy, those with no prior pregnancies were not more likely to be continuing smokers, but those with multiple prior pregnancies were more likely to be current smokers. Having a prior complicated pregnancy was unrelated to continued smoking. One previous abortion was not related, but having more than one was highly related to being a current smoker. In this analysis, which controlled for the mother's age and week of pregnancy, use of an iron supplement was not significantly related to continued smoking. While learning of the dangers of smoking from a magazine or the radio or TV did not appear related to smoking when interviewed, a doctor's advice on this matter was related (with those receiving such advice more likely to be continuing smokers). Women who think that smoking is extremely negative to the fetus were less likely still to be smoking.

Table 9: Logistic regression of smoking continuation during pregnancy (N=279)

Variable	Subgroup		Logistic Regression		
	n	% smoking at interview*	***OR _{adj}	Lower 95% CI	Upper 95% CI
Mother's age at interview			1.087	1.070	1.103
Week of pregnancy at interview			1.078	1.063	1.093
Number of older relatives in HH					
0	142	7.0	1.000		
1	43	14.0	2.048	0.678	6.187
2	84	14.3	2.709	1.014	7.233
More than 2	9	44.4	9.316	1.895	45.785
Father					
Lives with mother and does not smoke	73	2.7	1.00		
Lives with mother and Smokes	191	13.6	5.957	1.376	25.795
Does not live with mother, Smokes	6	50.0	36.812	2.908	465.989
Does not live with mother,	8	12.5	3.142	1.199	49.671

does not smoke					
Older relatives in HH smoke (if older relative in HH)					
No	102	11.8	1.000		
Yes	88	18.2	1.859	0.787	4.393
Mother consumed alcohol in first month of pregnancy					
No	1741	90.81	1.000		
Yes	84	82.11	2.239	1.0650	4.707
Mother consumed coffee in first month of pregnancy					
No	152	7.2	1.000		
Yes	103	19.4	3.146	1.461	6.774
Number of previous pregnancies					
One	74	6.8	1.000		
None	161	9.3	1.142	0.372	3.508
Two	21	23.8	4.114	1.074	15.764
More than two	23	30.4	6.837	2.021	23.132
Prior complicated pregnancy					
No	197	12.7	1.000		
Yes	82	9.5	0.756	0.329	1.740
Number of prior induced abortions					
None	218	9.2	1.000		
One	32	5.9	0.685	0.186	2.529
More than one	27	37.0	4.910	2.101	11.473
Used iron supplements during present pregnancy					
No	226	13.3	1.000		
Yes	53	3.8	0.506	0.170	1.504
Learned of dangers** of smoking during pregnancy from magazine					
No	137	15.3	1.000		
Yes	142	7.7	0.588	0.284	1.216
Learned of dangers** of smoking during pregnancy from radio/TV					
No	164	14.0	1.000		
Yes	115	7.8	0.626	0.291	1.348
Doctor advised about harmful tobacco impact**					
No	128	6.2	1.000		
Yes	146	16.4	3.025	1.312	6.973
Believes that impact** of smoking is extremely negative					
No	199	14.1	1.000		
Yes	80	5.0	0.368	0.141	0.957

* quit before or during pregnancy, **to unborn child, ***OR_{adj}= odd ratio, adjusted for mother's age and pregnancy duration at the time of interview. CI=Confidence interval

Fertility, complications of pregnancy and birth outcomes

Table 10 shows the rates of various problems before and during pregnancy that were associated with delivery and with the birth outcome. Fisher's exact tests identified univariate associations with the smoking variables indicated in the column headings: whether or not the mother smoked before this pregnancy, whether or not the mother smoked when interviewed, and whether or not the baby's father was a smoker. Cells in the table are filled in only when there was at least a trend toward a significant relationship (one-tailed $P < 0.15$).

Smoking was associated with lower fertility (unprotected sex for a year or more before pregnancy). Data from Denmark show similar effects of woman's smoking on fertility with $OR = 1.8$ (Haustein, 1999). Other authors also document increased risk of fertility problems in smoking women (Thomford and Mattison, 1986; Tzonou et al., 1993; USDHHS, 2001). Past abortions were more common with past, present or father smoking. Chronic adnexitis and chronic colpitis (self-reported) was more common with past smoking.

During pregnancy, late toxicosis appeared to be more common with past smoking and father smoking. Smoking during the pregnancy was related to placental insufficiency. Father's smoking was related to miscarriage threat, and mother's past smoking was related to anemia in pregnancy.

Several birth outcomes were related to one or more of the smoking variables. Past smoking by the mother was related to small chest circumference, a large fetus, and having a male baby. Smoking during the pregnancy was related to low birth weight (controlling for the baby's sex), fetus hypotrophy, hip joint dysphasia and having a male child (a carry-over from smoking prior to conception). The father being a smoker was associated with small head and chest circumference, low functional status, the fetus being immature, and hip joint dysphasia.

Two variables characterizing the delivery process were also associated with reported ETS exposure. These were excessive bleeding during delivery and early gestational age. Fetal hypoxia was associated with other older household members smoking.

Table 10: Rates of various problems before and during pregnancy, during delivery and related to the outcome of the pregnancy according to smoking by the mother and father

Problem	N	n (%) with problem	Mother smoked before pregnancy		Mother smoked at interview		Father Smoked	
			yes	no	yes	no	yes	no
Before pregnancy								
Fertility (>1 yr)	528	103 (19.5)	49 (24.1)	54 (16.6)	10 (45.5)	93 (18.3)	73 (25.1)	30 (12.7)
Prior abortions	696	118 (17.0)	61 (21.9)	57 (13.7)	12 (37.5)	107 (16.1)	82 (20.8)	36 (12.0)
Chronic adnexitis (salpingoophoritis)	244	59 (24.2)	33 (32.0)	26 (18.4)				
Chronic colpitis (vaginits) self-reported	695	9 (1.3)	7 (2.5)	2 (0.5)			9 (2.3)	0 (0.0)
During Pregnancy								
Late toxicosis	244	36 (14.8)	20 (19.4)	16 (11.3)			25 (18.0)	11 (10.5)
Placental insufficiency	244	28 (11.5)			4 (33.3)	24 (10.3)		
Miscarriage threat in third trimester	147	11 (7.5)					9 (10.5)	2 (3.3)
Anemia in pregnancy	244	119 (48.8)	40 (38.8)	79 (56.0)				
Delivery								
Non-cephalic birth	244	13 (5.3)	8 (7.8)	5 (3.5)				
Birth outcomes								
Birth Wt < 3000 gm	243	30 (12.3)			3 (25.0)	31 (13.4)		
Head circumfer. ≤32 cm	219	16 (7.3)					12 (9.5)	4 (4.3)
Chest circumf. ≤32 cm	219	49 (22.4)	15 (16.5)	34 (26.6)			32 (25.4)	17 (18.7)
Fetus hypotrophy	243	14 (5.7)			2 (16.7)	13 (5.6)		
Functional status <6	242	14 (5.7)					11 (8.0)	3 (2.9)
Immature fetus	243	6 (2.5)					6 (4.3)	0 (0.0)
Large fetus	243	34 (13.9)	18 (17.5)	16 (11.3)				
Hip joint dysphasia	243	6 (2.5)			2 (16.7)	4 (1.7)	6 (4.3)	0 (0.0)
Male gender	243	130 (53.5)	60 (58.8)	70 (49.6)	10 (83.3)	120 (51.9)		

Table entries are frequency (percentage) with problem for factors related to column variables, P<0.15, one-tailed Fisher's exact test.

DISCUSSION

Our data suggest that the vast majority (>85%) of Ukrainian women smokers interviewed had quit before or during the present pregnancy. Less than 5% of the women in this study smoked when interviewed during their present pregnancy, and it is possible that some of these quit after the interview and prior to delivery. A number of factors were associated with continued smoking. Mothers who continued smoking lived in households with more family members, were less likely to live with the baby's father, and had more previous pregnancies and more previous abortions. Also, the baby's father was more likely to be a smoker. A history of prior smoking appeared related to several problems, including decreased fertility, chronic adnexitis, chronic colpitis, late toxicosis, and having a large baby (and also with the baby being male). Continued smoking during pregnancy was associated with placental insufficiency, low birth weight, fetus hypotrophy, and hip joint dysphasia. The father's smoking was associated with decreased fertility, late toxicosis, miscarriage threat in the third trimester, small baby, and lower functional status. There was little indication that receiving information about the dangers of smoking to the health of the mother or fetus influenced smoking cessation either before or during pregnancy.

The prevalence of smoking during pregnancy in our study was lower than in most studies of smoking in pregnancy in New Zealand (Ford, et al., 1993), Norway (Eriksson et al., 1998), Spain (Mas, Escriba and Colomer, 1996), Sweden (Ahlsten, Cnattingius and Lindmark, 1993) while it was similar to the rates in a study carried out in the Czech Republic (Hruba and Kachlic, 2000), where 63.4% women were never smokers, 32.2% women reported they had stopped smoking either before pregnancy or during the first trimester, and only 4.4% of mothers smoked during the entire pregnancy. Similarities of these results from two Eastern European countries probably derive from the features of a less advanced stage of the tobacco epidemic than exists in western countries. In earlier-stage countries, smoking prevalence among women is still much lower than among men. Also, the proportion of highly dependent smokers is lower than in later-stage countries.

While other studies have found that women in low-income groups have the highest rates of cigarette use before, during and after their pregnancy (Najman, et al., 1998), we did not find significant differences in smoking during pregnancy for women from families with different income levels. A higher level of education was positively related to quitting smoking in other studies (Severson, Andrews, Lichtenstein, Wall and Zoret, 1995). The less advanced stage of the tobacco epidemic in Ukraine is characterized by the fact that more educated women still smoke more than less educated women, although the opposite was observed for male smokers.

Previous work has shown that the family environment is an important factor influencing smoking by pregnant women (Jane et al., 2000). Smoking by a partner has been taken into account in many studies, and women with smoking partners are known to continue smoking to a greater extent (Hakansson, Lendahls and Petersson, 1999; McLeod, Pullon

and Cookson, 2003; Severson et al., 1995). A negative influence of other smokers in the household was shown in Canada (Paterson, Neimanis and Bain, 1995), but a similar trend in our study did not reach statistical significance. In another Canadian study, mothers who quit were also less likely to allow smoking in their homes (Severson et al., 1995). The importance of ETS exposure and other smokers at home or at work was also shown by Cnattingius and Thorslund, 1990. Finally, women who do not live with the baby's father are less likely to quit smoking (Cnattingius and Thorslund, 1990). For the most part, these results are consistent with our findings.

Our study revealed an association of continued smoking during pregnancy with coffee and alcohol consumption. Other studies show that ex-smokers use more coffee than nonsmokers but somewhat less than smokers and suggest that the pharmacologic effect of caffeine in coffee may be partially responsible for the relationship. Reported nicotine withdrawal symptoms may be a mixture of nicotine withdrawal and caffeine toxicity (Swanson, Lee and Hope, 1994). Others (Heppel and Robson, 1996) consider caffeine a possible adjunct to smoking relapse prevention measures and report that caffeine did not increase the severity of symptoms but did decrease the severity of withdrawal-induced hunger. Other findings suggest that, if the blood levels of caffeine are not increased, coffee consumption does not increase the severity of tobacco withdrawal (Oliveto, et al., 1991).

Continued smoking has been shown to be significantly more common among women with previous births (Cnattingius and Thorslund, 1990), and this relationship appeared to hold in our study as well. Also, in our study, there was a significant link with between smoking and having previously had more induced abortions. (It should be noted that there is a higher rate of abortion in Ukraine than in many other countries.)

This study has a number of limitations. The women who agreed to participate in the study may be different in some respects from those who attended the clinics but did not participate. It is not known when the women who had smoked before the current pregnancy but were not smoking at the time of the interview had quit. They may have quit years before or in the early part of their current pregnancy. Not all women had pregnancy outcome data, but a comparison of those with and without these data (see Appendix) did not reveal any important differences between these groups. Finally, the small numbers of women in subgroups reduces statistical power to identify meaningful differences.

SUMMARY, CONCLUSIONS, RECOMMENDATIONS

Summary

Smoking during pregnancy is at low levels in Ukraine, and is associated with family structure, the baby's father smoking, and the number of previous abortions. Smoking by the mother (before and during the pregnancy) and the baby's father was associated with a

number of adverse outcomes for the pregnancy and the child. There was no evidence that information on the dangers of smoking while pregnant from any source encouraged cessation.

Conclusion

To protect the health of their future unborn children, it would be optimal to target all women of reproductive age to quit smoking before they consider becoming pregnant. If a woman is smoking at the time of her first prenatal visit, every effort should be made to encourage her to quit and stay smoke-free.

Recommendations

1. The first step in counseling on tobacco issues should be to *establish smoking status*. Women trying to quit or those who have already stopped smoking during their pregnancy should get more attention from health professionals, with cessation assistance provided to those trying to quit and relapse prevention counseling for quitters.
2. A well established precondition of effective counseling is *personalized advice* to stop smoking, which links the necessity to quit to personal circumstances and health. It is particularly important that women with reproductive organ problems, complications during previous pregnancies or during the current pregnancy be advised and assisted to quit.
3. The *issue of ETS exposure by the pregnant woman* and her fetus needs to be addressed as part of prenatal counseling. This will inform the nonsmoker of the importance to her fetus of a smoke-free environment and motivate her to guard against ETS exposure. It may also increase smokers' negative perceptions of smoking in general and increase her motivation to quit.
4. Combined tobacco, alcohol and coffee use by many women means that efforts to help with smoking cessation should *not address just the issue of smoking but a whole range of substances*.
5. The influence of the father's smoking on the mother's continued smoking means that smoking cessation assistance should be *aimed not only at women but at their partners* and perhaps other family members as well.

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APPENDIX 1: COMPARISON OF WOMEN WHOSE BIRTH RECORDS WERE AND WERE NOT OBTAINED

There were four groups defined in terms of availability of birth outcome data.

1. Birth outcome data obtained (n=244).
2. No record of delivery in any collaborating Kiev hospital obstetrical ward (n=352).
There could be several reasons for these women to have not been found: (a) they were overlooked in the lists, (b) they gave birth in other hospitals in Kiev, in other cities, or at home, or (c) they could have miscarried.
3. Women who delivered in a non-collaborating hospital, birth outcome data not available (n=63).
4. Women found on lists of collaborating hospitals, but whose birth records were kept confidential (n=39).

These four groups are compared in the Appendix table for a number of variables collected. Few differences among the groups were apparent. Most importantly, there were no significant differences among the groups for the variables concerned with smoking status.

The women in group 4 were a little older, and those in group 2 were interviewed a little earlier in their pregnancy. Women in group 1 appeared to use iron containing supplements more than those in the other groups. Women in group 2 had greater frequency of alcohol use in the month prior to their pregnancy, and were less likely to take pre-natal vitamins. This group also appeared to be somewhat more likely to be informed about the dangers to the fetus on tobacco use from books and special magazines. Group 3 women had higher rates of preterm deliveries and caesarean sections in previous pregnancies, so they may have intended to give birth in a certain hospital with the staff they already knew. Group 4 women did not appear to differ in any major way from the other groups, suggesting that the unavailability of their records was unrelated to pre-existing factors.

Appendix table. Comparison of women whose birth records were and were not obtained. Top portion of table shows results for continuous or ordinal variables, and lower portion for discrete variables.

	ANOVA		Group1 Birth outcome data available			Group2 Lost group			Group3 Non-collaborating hospital			Group 4 Refused to provide data		
	F	Sig.	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Continuous/Ordinal Variables														
Age	2.14	0.09	244	25.41	4.42	352	24.74	4.40	63	25.06	4.34	39	26.31	4.74
Term of pregnancy	10.30	0.00	242	29.57	6.60	350	26.48	8.50	63	30.21	6.99	39	29.88	8.11
Number of pregnancy	0.20	0.90	244	1.67	1.16	352	1.63	1.16	63	1.70	1.23	39	1.74	1.21
Number of abortions	0.14	0.94	244	0.31	0.85	352	0.31	0.90	63	0.27	0.75	39	0.38	0.91
Number of deliveries	0.96	0.41	244	0.25	0.46	352	0.21	0.47	63	0.32	0.56	39	0.23	0.43
Number of spontaneous abortions	0.05	0.98	244	0.11	0.48	352	0.11	0.35	63	0.11	0.36	39	0.13	0.41
Frequency of alcohol use per month	2.87	0.04	233	2.14	2.35	333	2.65	3.25	60	1.92	1.61	38	1.74	1.48
Amount of money spent on iron supplement	3.35	0.02	244	12.32	30.08	352	6.68	21.58	63	4.65	13.87	39	6.11	17.06
Number of capsules/tablets	2.76	0.04	244	17.42	34.40	352	9.83	29.29	63	11.59	39.81	39	10.77	27.95
Discrete Variables	Chi-Square Analysis													
	Chi- square	P	N	n	%	N	n	%	N	n	%	N	n	%
Complications of previous pregnancy														
Miscarriage threat	0.370	0.95	90	8	8.9	130	10	7.7	22	2	9.1	17	2	11.8
Preterm delivery	16.500	0.00	90	2	2.2	130	0		22	3	13.6	17	1	5.9
Caesarean section	7.274	0.06	90	4	4.4	130	3	2.3	22	3	13.6	17	0	
Tobacco use														
Smoking before pregnancy	2.619	0.45	244	103	42.2	349	142	40.7	63	22	34.9	39	12	30.8
Smoking during pregnancy	3.762	0.29	244	12	4.9	352	19	5.4	63	1	1.6	39	0	
Baby's father a smoker	4.417	0.22	244	139	57.0	351	190	54.1	62	39	62.9	39	27	69.2
Smoking in family	0.254	0.97	244	57	23.4	352	79	22.4	63	15	23.8	39	10	25.6
ETS exposure	4.097	0.25	240	82	34.2	344	133	38.7	62	29	46.8	39	17	43.6
Coffee use in the family	5.863	0.12	244	158	64.8	352	208	59.1	63	33	52.4	39	28	71.8

Mother-ever drugs use	2.021	0.57	243	3	1.2	350	2	0.6	62	1	1.6	38	1	2.6
Baby's father- ever drug use	1.021	0.80	242	7	2.9	346	6	0.7	62	1	1.6	39	1	2.6
Sources of information on dangers of smoking while pregnant														
Books	12.530	0.01	244	161	66.0	352	182	51.7	63	39	61.9	39	22	56.4
Special magazines	12.710	0.01	244	145	59.4	352	170	48.3	63	43	68.3	39	22	56.4
Used vitamins for pregnant women	13.740	0.00	244	200	82.0	352	242	68.8	63	49	77.8	39	28	71.8



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