

# SOCIOECONOMIC FACTORS AND HEALTH RISKS AMONG SMOKING WOMEN PRIOR TO PREGNANCY IN HUNGARY

\*Andrea Fogarasi-Grenczer<sup>1</sup>, Ildikó Rákóczi<sup>2</sup>, Péter Balázs<sup>3</sup>, Kristie L. Foley<sup>4</sup>

<sup>1</sup>Semmelweis University, Faculty of Health Sciences, Institute of Health Promotion and Clinical Methodology, Department of Family Care and Methodology, Hungary  
Head of Institute: Gyula Domján, MD, PhD

<sup>2</sup>University of Debrecen, Health Care Faculty, Institute of Health Sciences, Department of Family Care Methodology and Public Health, Hungary  
Head of Department: Zsigmond Kósa, MD, PhD

<sup>3</sup>Semmelweis University, Faculty of General Medicine, Institute of Public Health, Hungary  
Head of Institute: Anna Tompa, MD, PhD

<sup>4</sup>Medical Humanities Program, Davidson College, North Carolina, USA  
Director: Lance K. Stell, PhD

## Summary

**Aim.** To assess the social and economic factors that influence tobacco smoking prior to pregnancy.

**Material and methods.** This research was conducted among mothers who gave birth to babies in the two least developed counties in Hungary (Borsod-Abaúj-Zemplén and Szabolcs-Szatmár-Bereg) in 2009. Data were obtained from medical records of obstetrical wards and structured interviews conducted by local maternity and child service. There were 7,877 women with complete data on smoking habits among 9,040 women in the study. This represents 9.4% of total live births in Hungary and 71.1% of all live births in the two counties.

**Results.** The overall prevalence of smoking prior to pregnancy was 46.0%. Smoking women were typically less than 18 years old, underweight, with the lowest levels of education, those living in non-contractual cohabitation, and those with unhealthy dietary habits ( $p < 0.001$ ), further living in deep poverty ( $p < 0.05$ ).

**Conclusions.** While planning preventive actions to reduce female tobacco use in gestational age, the socioeconomic situation must be considered.

Key words: tobacco smoking, socioeconomic factors, ethnic groups, risk factors, prevention

## INTRODUCTION

While male tobacco smoking has levelled off in most of the developed countries, the frequency of smoking among women is on the rise. The European average is near 34%. Hungary is comparable to Greece, Portugal, Bosnia, Spain, and the United Kingdom. Only in Austria and Serbia is the frequency of smoking among women higher than in Hungary (1). Young girls start smoking very early and are often addicted smokers by the time they reach young adulthood. The prevalence of tobacco smoking among women aged 18-44 is 30.8% in Hungary (2). The level of education and the mother's active employment influence smoking cessation (3). Tobacco use and exposure to secondhand smoking is extremely dangerous for the mother and the foetus. Smoking contributes to premature birth (< 37 weeks gestation), low birth weight (< 2500 grams) (4). In 2009 Hungary's preterm births (PTB) and low birth weight (LBW) frequency (8.7% and 8.4%) was well-above the average of the European Union (EU), which was 6% (4, 5). In addition,

85% of the morbidity among newborn babies is due to PTB and/or LBW. The frequency of developmental disorders, stillbirth and other infant conditions (6), and the incidence of SIDS are growing (7).

In our study we aimed to identify socioeconomic factors that predicted smoking prior to pregnancy among mothers who gave birth to babies in the two least developed counties in Hungary (Borsod-Abaúj-Zemplén = BAZ, and Szabolcs-Szatmár-Bereg = Szabolcs) in 2009.

## MATERIAL AND METHODS

Our research was approved by the Ethical Committee of Semmelweis University. In the two countries mentioned above, mothers who gave birth to live babies between January 1, 2009 and December 31, 2009 were invited to participate in our research. The final sample was 9,040 mothers, which represents 71.1% of all mothers ( $N = 12,732$ ) of live birth cases in these two counties. It means 9.4% of all live births (96,442) in Hungary

during 2009. Mothers were informed about the aims of the research and the method we applied, and they provided formal consent to participate.

Data were obtained from medical records of obstetrical wards and through in-person interviews administered by the local maternity and child service.

**Demographic, Social and Economic status:** we measured the mothers' age groups (years < 18, 18-34, 35-40, 41+), ethnicity (self-admitted as Roma or non-Roma), body mass index (BMI = kg/m<sup>2</sup>) converted to a categorical variable (underweight = <18.49, normal weight = 18.5-24.9, overweight = 25-29.9, obese = 30 or greater), level of education (less than 8 grades of primary school, completed 8 grades, secondary education, college and/or university), employment status (employed, unemployed, various as students, disabled, on social benefit), marital status (married, non-contractual cohabitation, separated or divorced, single or widowed), number of children converted also to 3 categories (1-2, 3-6, 7-13), and dwelling circumstances (full, partial amenities and without basic amenities [running water, indoor plumbing, and heat]). Level of income/capita was determined by comparing the self-reported family income with data of the Central Statistical Office (CSO). Thus, the upper limit of deep poverty is reached if there are two children and two employed adults in the family and the income per capita is less than half of the average income per capita of the relevant year (8, 9). Poverty means 50-80%, at poverty level 80-120%, sufficient 120-170% and wealthy above 170% of this level.

**Health Behaviours:** dietary habits related to fresh fruits, vegetables, dairy and meat products in 4 categories of consumption were measured (at least once a day, every other day, once or twice a week, less than once a week). Coffee and alcohol (wine and beer) consumption were measured in 3 categories (coffee: at least every other day, 1-2 times a week and seldom or never, alcohol: at least once a week, less than per week, and never).

Descriptive statistics (means, standard deviations, ranges and frequencies) were used to describe the sample. Bivariate associations were calculated on all variables and their relationship to smoking status using the Pearson's Chi-square test. Logistic regression analyses were computed to assess the relationship of socioeconomic and health behavior status to smoking prior to pregnancy. Results are reported in odds ratios (ORs) and 95% confidence interval (CI). All data were analysed using SSPS (19.0) statistical program.

## RESULTS

The prevalence of tobacco smoking among 7,877 women was 42.0% before pregnancy. Table 1 shows demographic, socioeconomic and life style characteristics of this sample.

Smoking women were younger (average age 26.8 years, range 14-46) 57.4% of Roma women were smoking compared to 36.8% of the non-Roma. The proportion of smokers was more than two times greater among those who did not complete 8 grades of primary school. Married women are less likely to

Table 1. Smoking habits prior pregnancy related to demographic, socioeconomic and lifestyle characteristics of smoking (n=3421) and non-smoking (n=4456) mothers (N=7877) with live born babies in 2 north-eastern counties in Hungary in 2009.

Variables	Overall (N)	Smokers (n)	non-Smokers (n)	p-value
<b>Ethnicity (n,%)</b>	<b>6932</b>	<b>2993</b>	<b>3939</b>	<0.001
Roma	2150	1235 (41.3)	915 (23.2)	
non-Roma	4782	1758 (58.7)	3024 (76.8)	
<b>Age in years</b>	<b>7833</b>	<b>3402</b>	<b>4431</b>	<0.001*
x, (sd)	27.7 (6.0)	26.8 (6.1)	28.4 (5.9)	
min-max	14-46	14-46	14-46	
<b>Age categories (n,%)</b>				<0.001
<18	286	133 (3.9)	153 (3.5)	
18-34	6446	2846 (83.7)	3600 (81.2)	
35-40	987	371 (10.9)	616 (13.9)	
41+	114	52 (1.5)	62 (1.4)	
<b>BMI (kg/m<sup>2</sup>)</b>	<b>7485</b>	<b>3230</b>	<b>4255</b>	N.A.
mean (sd)	22.87 (4.75)	22.34 (4.69)	23.28 (4.73)	
min-max	12.89-50.78	13.06-50.78	12.89-47.83	

Variables	Overall (N)	Smokers (n)	non-Smokers (n)	p-value
<b>BMI categories (n,%)</b>				<0.001
Underweight	1103	617 (19.1)	486 (11.4)	
Normal	4482	1904 (58.9)	2578 (60.6)	
Overweight	1226	463 (14.3)	763 (17.9)	
Obesity	674	246 (7.6)	428 (10.1)	
<b>Education (n,%)</b>	<b>7846</b>	<b>3494</b>	<b>4815</b>	<0.001
<8 grades	750	478 (14.0)	272 (6.1)	
Completed 8 grades**	2286	1285 (37.7)	1001 (22.6)	
Secondary	3429	1403 (41.1)	2026 (45.7)	
University/college	1381	244 (7.2)	1137 (25.6)	
<b>Employment (n,%)</b>	<b>7838</b>	<b>3490</b>	<b>4432</b>	<0.001
Employed	3196	1033 (30.3)	2163 (48.8)	
Unemployed	1899	1044 (30.7)	855 (19.3)	
Varia***	2743	1329 (39.0)	1414 (31.9)	
<b>Marital Status (n, %)</b>	<b>7849</b>	<b>3407</b>	<b>4442</b>	<0.001
Married	4078	1301 (38.2)	2777 (62.5)	
Non-contractual cohabitation	3371	1866 (54.8)	1505 (33.9)	
Separated/divorced	118	68 (2.0)	50 (1.1)	
Single/Widowed	282	172 (5.0)	110 (2.5)	
<b>N. of children</b>	<b>7877</b>	<b>3421</b>	<b>4456</b>	<0.001*
x, (sd)	2.3 (1.5)	2.5 (1.7)	2.1 (1.3)	
min-max	1-13	1-13	1-13	
<b>N. of children (n,%)</b>				
1-2	5435	2144 (62.7)	3291 (73.9)	<0.001
3-6	2260	1160 (33.9)	1100 (24.7)	
7-13	182	117 (3.4)	65 (1.5)	
<b>Income/capita (n,%)</b>	<b>7563</b>	<b>3325</b>	<b>4238</b>	<0.001
Deep poverty	3576	2025 (60.9)	1551 (36.6)	
Poverty	2177	817 (24.6)	1360 (32.1)	
At poverty level	1126	298 (9.0)	828 (19.5)	
Sufficient/Wealthy	684	185 (5.6)	499 (11.8)	
<b>Housing conditions (n,%)</b>	<b>7386</b>	<b>3212</b>	<b>4147</b>	<0.001
Full amenities	4390	1540 (47.9)	2850 (68.3)	
Partial amenities	1379	689 (21.5)	690 (16.5)	
Without amenities	1617	983 (30.6)	634 (15.2)	

Variables	Overall (N)	Smokers (n)	non-Smokers (n)	p-value
<b>Dietary habits</b>				
<b>Fresh fruits (n,%)</b>	<b>7812</b>	<b>3397</b>	<b>4415</b>	<0.001
At least once a day	5420	2100 (61.8)	3320 (75.2)	
Every other day	812	386 (11.4)	426 (9.6)	
Once or twice a week	1044	570 (16.8)	474 (10.7)	
Less than once a week	536	341 (10.0)	195 (4.4)	
<b>Vegetables (n,%)</b>	<b>7807</b>	<b>3391</b>	<b>4416</b>	<0.001
At least once a day	4696	1788 (52.7)	2908 (65.9)	
Every other day	1176	510 (15.0)	666 (15.1)	
Once or twice a week	1296	701 (20.7)	595 (13.5)	
Less than once a week	639	392 (11.6)	247 (5.6)	
<b>Dairy products (n,%)</b>	<b>7809</b>	<b>3446</b>	<b>4414</b>	<0.001
At least once a day	5522	2211 (65.1)	3311 (75.0)	
Every other day	924	421 (12.4)	503 (11.4)	
Once or twice a week	797	430 (12.7)	367 (8.3)	
< once a week	566	333 (9.8)	233 (5.3)	
<b>Meat products (n,%)</b>	<b>7776</b>	<b>3374</b>	<b>4402</b>	<0.001
At least once a day	4914	2035 (60.3)	2879 (65.4)	
Every other day	1500	656 (19.4)	844 (19.2)	
Once or twice a week	1034	505 (15.0)	529 (12.0)	
Less than once a week	328	178 (5.3)	150 (3.4)	
<b>Coffee (n,%)</b>	<b>7715</b>	<b>3362</b>	<b>4353</b>	<0.001
At least once a day	3708	2235 (66.5)	1473 (33.8)	
Every other day	124	65 (1.9)	59 (1.4)	
1-2 times a week	148	48 (1.4)	100 (2.3)	
Seldom/never	3735	1014 (30.2)	2721 (62.5)	
<b>Alcohol (wine/beer) (n,%)</b>	<b>7606</b>	<b>3362</b>	<b>4616</b>	<0.001
At least once a week	40	40 (1.2)	18 (0.4)	
Less than a week	556	328 (9.9)	228 (5.3)	
Never	6992	2945 (88.9)	4047 (94.3)	

\* t-probe, all other p-values were processed by the Pearson's chi-square test

\*\* Primary school

\*\*\* Disabled, student, etc.

smoke than non-married women (38.2% and 54.8% respectively). Deep poverty is more prevalent among smokers (60.9%) than non-smokers (36.3%). Housing conditions without amenities doubles the proportion of those who smoke (30.6% versus 15.2%). 10% of smoking women consume fresh fruits less than once a week compared to 4.4% among non-smoking women. Drinking coffee at least once a day was nearly two times more frequent among smoking women (66.5% v. 33.8%).

In a multivariable logistic regression model (tab. 2), factor significantly associated as protective against smoking was the age more than 18 years. Smokers were underweight versus overweight and obesity, women with less than 8 grades of primary school were more likely to smoke than those with university or college graduation. Non-contractual cohabitation versus being married facilitated smoking like living in deep poverty versus at poverty level. Women with daily consumption of caffeine were the most likely to smoke prior to pregnancy.

Table 2. Multivariable logistic regression model of women's smoking prior pregnancy versus non-smoking (N=5845) by demographic, social, and lifestyle characteristics in 2 Eastern Hungarian countries.

Variables	OR	95% CI	<p-value
Roma v. non-Roma	0.96	0.80-1.14	N.A.
<b>Age vs. &lt;18 years</b>			
18-34	0.38	0.25-0.58	0.001
35-40	0.25	0.18-0.36	0.001
41+	0.32	0.21-0.46	0.001
<b>BMI underweight vs.</b>			
normal weight	1.09	0.93-1.28	N.A.
overweight	1.42	1.16-1.75	0.001
obese	1.30	1.02-1.65	0.05
<b>Education &lt;8 grades vs.</b>			
8 grades (primary school)	1.05	0.85-1.30	N.A.
secondary	1.26	0.97-1.64	N.A.
university/college	2.81	2.03-3.88	0.001
<b>Employed before birth vs.</b>			
unemployed	0.87	0.74-1.04	N.A.
varia (disabled, student, etc.)	1.07	0.90-1.26	N.A.
<b>Family status vs. married</b>			
non-contractual cohabitation	1.76	1.33-2.35	0.001
separated or divorced	0.98	0.74-1.30	N.A.
single or widowed vs.	0.88	0.52-1.48	N.A.
<b>1-2 children vs.</b>			
3-6	0.98	0.85-1.13	N.A.
7 or more	0.70	0.47-1.02	N.A.
<b>Deep poverty of the family vs.</b>			
poverty	1.17	1.00-1.38	N.A.
at poverty level	1.42	1.14-1.77	0.05
sufficient/ wealthy	1.12	0.86-1.46	N.A.

Variables	OR	95% CI	<p-value
<b>Housing without amenities vs.</b>			
full amenities	1.08	0.89-1.29	N.A.
partial amenities	1.00	0.82-1.22	N.A.
<b>Consumption &lt;daily vs. daily of...</b>			
fruit	1.05	0.90-1.22	N.A.
vegetable	1.16	1.01-1.34	0.05
dairy	1.10	0.96-1.26	N.A.
meat	1.04	0.92-1.18	N.A.
Caffeine daily vs. <daily	3.50	3.11-3.93	0.001

## CONCLUSIONS

According to the WHO report and population-based studies conducted in Hungary, the average frequency of smoking among adult Hungarian women is between 30.8% and 33.9% (1, 2). In our sample 46% of women (between the ages of 14 and 46) who delivered live babies in 2009 were smokers at the time they learned they were pregnant, which demonstrates considerable regional differences within this country. Roma are also disproportionately represented in these communities. Self-identified Roma occurred more frequently (41.3%) among smokers than non-smokers (23.2%). Nevertheless, we found no association with smoking versus non-smoking status prior to pregnancy and the Roma ethnicity in the relevant multivariable logistic regression model, which suggests that Roma ethnicity is a proxy for the underlying social and economic conditions that they experience and not a risk factor for smoking during pregnancy in and of itself. Unfortunately, smoking is strongly related to the Roma identity from childhood, but they are not aware of the facts that many health conditions and symptoms experienced by them and their children are correlated with smoking. In Roma communities, smoking may be one way to cope with the permanent stress load of income insecurity and social isolation (10-12).

We demonstrated that low socioeconomic status increases tobacco use rates more than 1 1/2 times the average population in Hungary. A major initiative to improve health status must emphasize employment opportunities and the level of education in these impoverished communities. Higher level of education determines job opportunities, expertise, and one's working positions, housing circumstances and level of income, further factors of lifestyle (e.g. such as eating habits). The cooperation of health care, education, civil and governmental organizations is necessary, because these are the most important indispensable devices for the realization of preventive actions against smoking and the improvement in overall well-being (13). Concerning inequalities

in accessing health care, setting up available health services at primary and secondary level in rural and underdeveloped regions would also be necessary for expectant mothers.

## ACKNOWLEDGEMENTS

Our study was supported by National Institutes of Health (NIH), National Cancer Institute, National Institutes on Drug Abuse, and Fogarty International Center (Grant Number 1 R01 TW007927-01). Our scientific work was helped by Ágnes Huszár who is a student at Semmelweis University Faculty of Health Sciences, Institute of Health Promotion and Clinical Methodology. We are grateful for the work of district health visitors. □

## References

- Shafey O, Eriksen M, Ross H, Mackay J: The Tobacco Atlas. 3<sup>rd</sup> edition. (Table A The Demographics of Tobacco). The American Cancer Society, Atlanta 2009.
- Tombor I, Paksi B, Urbán R et al.: Dohányzás elterjedtsége a Magyar felnőtt lakosság körében. (Prevalence of Smoking among the Hungarian Adult Population). *Népegészségügy* 2010; 88 (2): 131-136.
- Foley KL, Balázs P, Greczner A, Rákóczi I: Factors Associated with Quit Attempts and Quitting among Eastern Hungarian Women who Smoked at the Time of Pregnancy *Cent Eur J Public Health* 2011; 19 (2): 63-66.
- Élvezületési adatok az anya tényleges lakóhelye szerint, (Livebirth Data Based on the Real Residence of the Mother), KSH, Tájékoztatási adatbázis, Népegészségstatisztika, Népmozgalmi adatok, 2009. <http://statinfo.ksh.hu/Statinfo/themeSelector.jsp?page=1&theme=WD> (2011.11.28).
- Perinatal Statistics in the Nordic Countries, <http://www.stakes.fi/EN/tilastot/statisticsbytopic/reproduction/perinatalreproduction-summary.htm> (2011.11.28).
- Páll G, Valek A, Szabó M: Neonatalis Intenzív Centrumok tevékenysége 2005-2009 között. (The Actions of NICU between 2005 and 2009). Budapest, Országos Gyermekégeszségügyi Intézet 2011.
- Wisborg K, Kesmodel U, Henriksen TB et al.: Prospective Study of Smoking during Pregnancy and SIDS. *Arc Dis Child* 2000; 83(3): 203-206.
- A Kormány 321/2008. (XII. 29.) Korm. Rendelete a Kötelező Legkisebb Munkabér (minimálbér) és a Garantált Bérminimum Megállapításáról (Government of Hungary: Regulation on Guaranteed Minimal Income), Munkaügyi Fórum, <http://www.munkaugyiforum.hu/archivum/minimalber-2009> (2012.01.15.).
- KSH: Létszám és kereset a nemzetgazdaságban, gyors tájékoztató, (Number of Employees and Wages and Salaries in National Economics) Budapest, 2009. január-december. <http://portal.ksh.hu/pls/ksh/docs/hun/xftp/gyor/let/let20912.pdf>.
- Csépe P: Hátrányos helyzetű csoportok egészségfelmérése és egészségfejlesztése különös tekintettel a roma populációra. (The Measurement

of the Health Status and Health Development of Disadvantaged Groups). PhD. Dissertation, Budapest, Central Library of the Semmelweis University, 2010. **11.** Janky B: A korai gyermekvállalást meghatározó tényezők a cigány nők körében (Factors Determining Early Willingness to have Children among Roma Women). Andorka Rudolf Emlékkonferencia BCE, Budapest 2006. október 10. **12.** Balázs P, Foley KL, Greczner A, Rákóczi I:

Roma és nem-roma népesség egyes demográfiai és szocioökonómiai jellemzői a 2009. évi szülészeti adatok alapján (Hungary's Roma and Non-Roma Population in Obstetrical Statistics in 2009: Demographic and Socioeconomic Characteristics) – Magyar Epidemiológia, 2011; 8: 67-75. **13.** Foley KL, Balázs P: Social Will for Tobacco Control among the Hungarian Public Health Workforce. Cent Eur J Public Health 2010; 18(1): 25-30.

Received: 07.05.2012

Accepted: 25.05.2012

Correspondence to:

\*Andrea Fogarasi-Greczner  
Semmelweis University Faculty of Health Sciences  
17 Vas St. 1088 – Budapest, Hungary  
tel.: +36 1 284 2792  
e-mail: grenczera@gmail.com