



Smoking Cessation During Pregnancy Among Roma and Non-Roma Women in Hungary's Underdeveloped Regions*

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Lower socioeconomic status is correlated with higher tobacco use worldwide. Using a retrospective cohort design, we conducted in-person surveys among women living in Hungary's underdeveloped regions to evaluate their smoking habits before, during, and after pregnancy. Forty-one percent ($n = 6,351$) of respondents with known smoking status and ethnicity ($n = 15,592$) smoked prior to pregnancy, 26.5% were self-identified Roma and 73.5% were non-Roma. During pregnancy, two third (65.8%) continued to smoke, although significant differences were observed across ethnicities. Roma women were nearly twice as likely to continue smoking as non-Roma women (98.3% vs. 50.5%, respectively). Using biometric and socioeconomic characteristics, we determined the associations of different factors with smoking habits separately for these two populations. We then assessed how these factors contributed to continued smoking during the pregnancy controlling for ethnicity. These results are essential while tailoring tobacco cessation programs for ethnic minorities who live in unfavorable socioeconomic circumstances.

Keywords: tobacco smoking and pregnancy, Roma ethnic minority, cessation during pregnancy

Introduction

The national smoking prevalence of the adult female population in Hungary was estimated between 23%-33% in 2012 (Forey, Hamling, Hamling, Thornton, & Lee, 2013). Deep poverty, limited formal education, weak economic activity, and social exclusion of ethnic minorities have a serious negative impact on smoking prevalence especially in the underdeveloped northeastern and southeastern regions of this country. The underdeveloped regions of Hungary are disproportionately Roma, the largest ethnic minority in the country. Among Roma women Kósa (2012) found heavy smoking prevalence with approximately 25% of women aged 8-29 years and 49% of women aged 30-44 years smoking at least one pack per day. As a result of multiple stress-inducing factors (such as social isolation), mental health of Roma is not only worse than that of the general

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population but also worse than that of ethnic majority groups who live under similar socioeconomic conditions (Kósa, 2012).

A recent American study of pregnancy cohorts (Keyes, March, Link, Chilcoat, & Susser, 2013) demonstrated that gradients of socioeconomic position strongly emerge across these cohorts rather than time alone. In our present study, before controlling for poverty, the proportion of pre-pregnancy smoking was 40.7%, separately 56.1% in the Roma and 35.2% in the non-Roma, which exceeds the Hungarian national female average. When stratifying by poverty status, 57.4% of Roma women living in deep poverty were smokers.

Based on a large sample ($n = 21,248$), maternal smoking is clearly related to increased relative risk of LBW (low birth weight) and PTB (preterm birth) of babies (Koet al. 2013). In Hungary, the average prevalence of LBW was 8.6% and that of PTB 8.8% in 2010-2012 (Statistical Yearbook of Hungary, 2012). In our comparably large initial sample of women with live-born babies without stratifying for ethnicity ($n = 18,633$), the prevalence of LBW was 9.3% that of PTB 8.6%. When controlled for continued smoking during pregnancy, the proportion of LBW was 16.6% and that of PTB 12.8%.

Unfortunately, there are no precise domestic demographic data about the Roma. The last census conducted in 2011 indicated a 315,000 minority population (Census National Data, 2011). However, the European Union Framework for National Roma Integration Strategies up to 2020 contains semi-officially estimated data (European Commission, 2011). Within the European Union, Hungary has the fourth largest estimated Roma population (7.05%) after Bulgaria (10.33%), the Slovak Republic (9.17%) and Romania (8.32%). According to this document, the average estimated number of Roma in Hungary is 700,000 (more than twice what was reported in the 2011 census). In the north-eastern region of the country, according to the estimates of the 2011 census, Roma comprise approximately 6.0%-8.5%, while in the south-eastern region approximately 1.5%-2.9%.

There are numerous studies concerning the poor health status of the European especially the Central European Roma population (Parekh & Tamsin, 2011; Fésűs, Östlin, McKeec, & Ádány, 2012; Kolarcik, Madarasova, Orosova, van Dijk, & Reijneveld, 2009; Vokó et al., 2009; Kósa, Lénárt, & Ádány, 2002; Kósa et al., 2007; Hujová et al., 2010). Targeted studies were also published about the reproductive health of Roma women (Bobak, Dejmek, Solansky, & Sram, 2005; Rambouskova, Dlouchy, Krizova, Prochazka, Hrcirova, & Anđel, 2009; Foley, Balázs, Greczer, & Rákóczi, 2011). According to Bobak et al. (2005), 73% of pregnant Roma women were smoking prior to the pregnancy and 63% continued the habit during the full gestation period. Rambusková et al. (2009) found in a relatively small sample (76 Roma versus 156 non-Roma women) 85.5% smoking prevalence among Roma and 57.9% continued smoking during the pregnancy.

Considerable differences in smoking prevalence between Roma and non-Roma women and the corresponding LBW and PTB differentials between the minority and majority ethnic groups emphasize the importance of properly adapted tobacco cessation programs in Hungary's underdeveloped north-eastern and south-eastern counties. As a recent review of the concerning literature demonstrated, behavioral interventions to promote smoking cessation in ethnic minorities need to be culturally adapted to be more effective. Thus, more systematic studies are needed to gain insight in diverse populations for establishing the best cultural adaptations of cessation programs (Nierkens et al., 2013).

In Hungary, there is a special MCHC (maternity and child health care) service with precinct-based nurses for regions with an average population of 2,000 or greater. MCHC nurses are responsible for pre-pregnancy, prenatal and postnatal care of women during their reproductive years. They are also trained to provide minimal intervention for tobacco cessation for smoking women as soon as women register their pregnancy with the

MCHC service. The government is supporting this program primarily in underdeveloped regions. However, notable differences in PTB and LBW proportions among ethnic groups illustrate the need for more effective motivational interventions to reduce tobacco use among the Roma minority population. The aim is rather complex as a recent comprehensive review of the literature indicated that there is no clear evidence of the effectiveness of culturally-adapted smoking cessation interventions in ethnic minority groups (Liu et al., 2013).

This study provides descriptive data on the obstetrical history, demographic, socioeconomic and sociocultural specialities and differences of smoking status among Roma and non-Roma pregnant women. Using these data, we assessed positive and negative factors for quitting when women learned they were pregnant. Given that pregnancy is a unique period in a woman's life, one when they would be highly motivated to quit smoking, it is essential to understand the multiplicity of social, economic, and cultural factors that contribute to tobacco use during pregnancy.

Materials and Methods

Human subjects' approval of our survey was provided by the ethics committee of Semmelweis University in Budapest, Hungary. We conducted a retrospective cohort study of women who delivered live born babies in 2009-2012. The target area was the underdeveloped northeastern and southeastern parts of the country in a former region with considerable Roma population. Local MCHC nurses while using their registers of pregnant and delivered women contacted the target population, which is a census of all births during the timeframe ($n = 24,979$). All contacts were made twice. Ultimately, 74.59% ($n = 18,633$) consented to participate in the study. Including women for whom smoking status and ethnicity were known, the sample was reduced to 15,592. Of these women, 6,351 (40.7%) smoked prior to the pregnancy and comprise our analytical sample.

Our research study consisted of two parts, with a total of 131 items in seven categories. The first part contained questions to be answered by the local MCHC nurses based on their own medical registers. These data include: age of mother, biometric data of mothers (weight in kg in the first trimester and height in cm) and basic data of obstetrical history. Among historical data, we collected information about the number of prior pregnancies, PTBs, and spontaneous and artificial abortions. Body mass index ($BMI = \text{kg}/\text{m}^2$, i.e., body mass in kilogram divided by height in meters squared) was converted to a categorical variable (BMI underweight ≤ 18.49 , normal weight = 18.5-24.9, overweight = 25-29.9, obese = 30 or greater). We dichotomized prior pregnancies as two or more versus zero or one.

Among socioeconomic and cultural variables, basic education means eight elementary school classes or less, non-married status is a comprehensive definition for contractual and non-contractual cohabitation and single mothers respectively. Participants without employment included all persons who receive different social benefits, disabled and students. There is no legal poverty level in Hungary, i.e., it is not a part of the legislation on the actual yearly budget of the central government. Instead, there is a statistical poverty level published annually by the Central Statistical Office of the country and is generally used as a proxy for economic status of the population. Based on the OECD standard, 50% (in the European Union 60%) of the median income equals the income poverty level. The median income/month/consumption unit increased from HUF 60,000 in 2009 to 84,000 in 2012 (TÁRKI Social Research Institute Inc., 2013). Deep poverty level was defined as $< 50\%$ of the average value. We defined housing without amenities as no connection to the water supply mains, to the sewage system, nor operational individual heating. Concerning dietary and lifestyle habits, only 0.9% of the whole sample ($n = 18,633$) admitted drinking alcohol (beer or wine) once a week or more often. ETS (environmental

tobacco smoke) was defined as noexposure, versus daily exposure by a husband or partner in confined spaces. Because our intent was to assess factors associated with quitting during pregnancy, we conducted all analyses only among women who indicated they smoked prior to pregnancy. We used *t*-probe for controlling ethnic distribution, ORs (odds ratios) with 95% confidence interval (95% CI) to show the relative importance of ethnicity in selected socioeconomic and cultural characteristics and binary logistic regression to assess factors associated with continuing versus quitting tobacco use during the pregnancy (significance level, $p \leq 0.05$).

Results

In the analyzed sample of women who smoked prior to the pregnancy ($n = 6,351$), there were 36.5% Roma and ($n = 2,321$), 63.5% non-Roma ($n = 4,030$). The overall proportion of smoking during pregnancy was 66.7%, but there were considerable ethnic differences; 89.3% of Roma were smoking during the pregnancy compared to 50.5% of non-Roma. Given the difference in smoking rates during pregnancy, we calculated bivariate associations biometric, obstetrical, demographic, socioeconomic, cultural, and lifestyle variables related to the Roma versus non-Roma ethnicity (see Table 1). Although all differences were significant at $p < 0.05$, divergences were the greatest between Roma and non-Roma in the following areas, with Roma being at a greater disadvantage: educational level (OR = 21.2), being unemployed (OR = 17.55) and living in deep poverty (OR = 12.82) followed by housing without amenities. Concerning dietary habits, Roma had reduced consumption of fruit (OR = 3.38), vegetables (OR = 2.64), dairy products (OR = 2.51), and meat (2.51). Roma were twice as likely as non-Roma to be underweight. Being unmarried was more typical among pregnant Roma women (OR = 3.07), as was being young (OR = 5.73), and having a non-intended pregnancy (OR = 3.28). ETS impact by husband or partner in confined spaces was nearly five times (OR = 4.70) as likely among Roma versus non-Roma respondents. Finally, Roma respondents were more likely to have had a prior pregnancy (OR = 2.34) and more likely to have had a previous PTB (OR = 1.51), spontaneous abortion (OR = 1.26) and artificial abortion (OR = 1.43).

Table 1

Bivariate Associations of Roma Versus Non-Roma Women Smoking Prior to the Pregnancy by Biometric, Socioeconomic, and Life-Style Variables (n = 6,351)

Variables	OR	95% CI	<i>p</i> -value
Roma vs. non-Roma (2,321/4,030)	5.73	4.12-7.97	< 0.001
Age 17 or less vs. older (198/6,153)	2.04	1.74-2.39	< 0.001
Roma vs. non-Roma (2,238/3,902)	3.28	2.94-3.65	< 0.001
BMI underweight vs. all others (752/6,905)	2.34	2.09-2.61	< 0.001
Roma vs. non-Roma (2,278/3,940)	1.51	1.29-1.78	< 0.001
Non-intended vs. intended pregnancy (2,620/3,598)	1.26	1.07-1.40	0.003
Roma vs. non-Roma (2,283/3,961)	1.43	1.27-1.60	< 0.001
Prior pregnancies 2 or more vs. less (3,883/2,361)	21.2	18.43-24.50	< 0.001
Roma vs. non-Roma (2,292/3,999)	3.07	2.74-3.45	< 0.001
Prior PTB vs. at term birth (662/5,629)			
Roma vs. non-Roma (2,315/4,020)			
Prior spontaneous abortion yes/no (1,103/5,232)			
Roma vs. non-Roma (2,313/4,016)			
Prior artificial abortion yes/no (1,684/4,645)			
Roma vs. non-Roma (2,413/4,697)			
Basic education vs. higher (3,119/3,991)			
Roma vs. non-Roma (2,309/4,011)			
Non married vs. married (3,891/2,429)			

(Table 1 to be continued)

Variables	OR	95% CI	p-value
Roma vs. non-Roma (2,304/4,015)	17.55	14.55-21.20	< 0.001
No-employment vs. employed (4,161/2,158)			
Roma vs. non-Roma (2,268/3,875)	11.43	9.96-13.11	< 0.001
Deep poverty vs. all others (3,368/2,775)			
Roma vs. non-Roma (2,218/3,769)	6.46	5.54-7.54	< 0.001
Housing without amenities vs. all others (975/5,012)			
Roma vs. non-Roma (2,304/4,015)	3.38	3.01-3.80	< 0.001
Fruits every 3rd day or less vs. more often (1,616/4,703)			
Roma vs. non-Roma (2,303/4,013)	2.64	2.36-2.95	< 0.001
Vegetables every 3rd day or less vs. more often (1,831/4,485)			
Roma vs. non-Roma (2,301/4,013)	2.51	2.22-2.85	< 0.001
Dairy every 3rd day or less vs. more often (1,262/5,052)			
Roma vs. non-Roma (2,289/4,002)	1.51	1.33-1.72	< 0.001
Meat every 3rd day or less vs. more often (1,194/5,097)			
Roma vs. non-Roma (2,276/3,976)	1.69	1.51-1.90	< 0.001
Coffee at least every other day vs. less often (4,227/2,025)			
Roma vs. non-Roma (2,242/3,908)	4.70	4.21-5.26	< 0.001
ETS by partner yes/no (2,344/3,806)			

The multivariable analysis (see Table 2) shows the contribution of the same variables (inclusive the Roma versus non-Roma ethnicity) in smoking cessation during the pregnancy. The dependent variable was defined as 1 = "Continued to smoke" or 0 = "Quit smoking". Prior legal abortion, housing circumstances, dietary habits related to fruit, vegetable and meat consumption did not have any significant impact on smoking habit during the pregnancy. The strongest influence on continued smoking was indicated by the lack of more than basic education (OR = 3.05), the ETS generated by husband or partner of the pregnant woman (2.98), and drinking coffee at least every day (OR = 1.95). The strongest impact on smoking cessation was age \leq 17 years (OR = 0.10) and being underweight (OR = 0.55). Self-identified Roma women were twice as likely to continue smoking during pregnancy also (OR = 2.02). Related to obstetrical history, prior PTB (OR = 0.65) and spontaneous abortion (OR = 0.67) were associated with a reduced likelihood of continued smoking.

Table 2

Binary logistic Regression of Biometric, Socioeconomic, and Life-Style Factors for Tobacco Smoking Cessation During the Pregnancy (n = 4,517)

Variables	OR	95% CI	p-value
Roma vs. non-Roma	2.03	1.64-2.51	< 0.001
Age 17 or less vs. older	0.10	0.08-0.14	< 0.001
BMI underweight vs. all others	0.55	0.44-0.70	< 0.001
Non-intended vs. intended pregnancy	1.40	1.18-1.65	< 0.001
Prior pregnancies 2 or more vs. less	1.53	1.27-1.85	< 0.001
Prior PTB vs. at term birth (718/6,348)	0.65	0.52-0.83	< 0.001
Prior spontaneous abortion yes/no (5,878/1,234)	0.67	0.55-0.82	< 0.001
Prior legal abortion yes/no (1,805/5,302)	0.87	0.72-1.05	0.152
Basic education vs. higher (3,119/3,991)	3.05	2.49-3.74	< 0.001
Non married vs. married (4,105/2,993)	1.48	1.25-1.74	< 0.001
No-employment vs. employed (4,434/2,668)	1.54	1.28-1.85	< 0.001
Deep poverty vs. all others (3,507/3,371)	1.60	1.33-1.92	< 0.001
Housing without amenities vs. all others (997/5,717)	1.07	0.82-1.39	0.610
Fruits every 3rd day or less vs. more often (1,671/5,423)	1.61	0.93-1.47	0.185
Vegetables every 3rd day or less vs. more often (1,943/5,148)	1.16	0.94-1.42	0.165

(Table 2 to be continued)

Variables	OR	95% CI	<i>p</i> -value
Dairy every 3rd day or less <i>vs.</i> more often (1,329/5,759)	0.69	0.56-0.85	< 0.001
Meat every 3rd day or less <i>vs.</i> more often (1,292/5,774)	0.88	0.72-1.08	0.237
Coffee at least every other day <i>vs.</i> less often (4,550/2,478)	1.95	1.65-2.29	< 0.001
ETS by partner yes/no (2,397/4,509)	2.98	2.48-3.57	< 0.001

Discussion

This study proved striking differences in smoking habits between Roma and non-Roma women prior to and after pregnancy in Hungary's underdeveloped regions. Concerning the serious negative impact of tobacco smoking not only on maternal but neonatal health, we assessed factors of cessation during the pregnancy as a formative step in designing effective interventions.

Age ≤ 17 years and BMI underweight proved to be strong protective factors. Among young girls, the success of cessation is most likely explained by a shorter duration of smoking. In addition, there is evidence that cessation results in body weight gain (Basterra-Gortari et al., 2010). Additionally, women are more prone to the belief that smoking controls weight (McKee, Nhean, Hinson, & Mase, 2006). BMI underweight (≤ 18.49) is not a desired condition for the well-being of the mother or baby, nevertheless, women who are underweight may be less concerned than normal or overweight women about pregnancy-related weight gain. Thus, they may be more likely to quit.

In our study, unintended pregnancy correlated significantly with continued smoking. In the USA, half of pregnancies are unintended and only half of all women who smoke cigarettes are able to quit during pregnancy (Chisolm, Cheng, & Terplan, 2014). Consequently, if cessation programs fail among fertile women, pregnancy intention must be a distinct indicator for cessation support during the pregnancy. Concerning the obstetrical history, prior legal abortion seems to have no significant impact on quitting tobacco smoking. However, prior PTB, and spontaneous abortion should be used as a powerful supportive factor in smoking cessation interventions timed to the pre- and early pregnancy care given that pregnant women want to ensure a successful pregnancy and healthy baby.

Limited education (eight or less elementary classes) with lower perceived risk to the fetus is a generally well-established predictor of continuing smoking during pregnancy. Yet, low levels of education have an important impact in the underdeveloped regions of Hungary. In our sample, the overall proportion of lower education was 47.6%; when stratified by ethnicity, however, clear disparities emerge. 87.5% and 24.7% of Roma and non-Roma women respectively have completed 8 grades or less of school. One could argue that keeping girls in school could be as (or more) important for ensuring the well-being of young girls (e.g., reducing unplanned pregnancies, reducing tobacco use, reducing maternal and neonatal health problems). It is also important to recognize the rise of non-marital childbearing and the growth of cohabitation. In the initial sample, the proportion of married women was 38.4% compared to cohabitant couples 61.6%. Thus, we agree with findings that continuing to smoke throughout the pregnancy is not a result of loneliness, but rather the lack of an intimate (marital) relationship (Kiernana & Pickett, 2006).

Concerning the socioeconomic status and contrasted to a recent study targeting African American women (Kendzor et al., 2012), our findings reaffirm previous research that unemployment and deep poverty are significant predictors of continued smoking during the pregnancy. However, because of the difference in samples between the Kendzor et al. (2012) study and ours, we can conclude that deep poverty among pregnant

women was definitely not associated with greater odds of quitting for economic reasons.

A specific study of smoking and non-smoking pregnant women's dietary habits indicated significant differences to the smokers' disadvantage in reduced intake only of milk product and vegetables (Ortega, Martines, Lopez-Sobaler, Andres, & Quintas, 1998). In our sample, reduced intake of dairy products was the only positive factor of smoking cessation. Considering the lack of data based on great samples in the literature correlating dietary and tobacco use behaviors during pregnancy, there is a clear need for surveys that address multiple lifestyle risk behaviors in a single project. Nevertheless, eating habits are for many reasons hardly comparable across nations and geographic regions thus related studies will only locally be relevant is smoking cessation interventions. Frequent coffee consumption was strongly interrelated with tobacco smoking. Among women who continued smoking, 76.6% drank coffee at least every other day.

ETS generated by partner was the second most important negative factor for not quitting during the pregnancy. It highlights the need to include smoking partners in studies hoping to reduce tobacco smoking during pregnancy (Ockene et al., 2002). Moreover, the lack of meaningful differences in the relationship between Roma and non-Roma and ETS exposure, suggests that family-based interventions are needed across all ethnic groups. The nature of this inclusion is critical because, e.g., only a booklet distributed for smoking partners about the commitment of the father to the pregnancy (quitting together would make a substantial positive impact on the health of the baby) had no effect on partners' smoking (de Vries, Bakker, Dolan Mullen, & van Breukelen, 2006). Innovative techniques (telephone interviews, involving the participants' local general practitioner and controlling carbon monoxide levels in the participants' home) were effective and suggested to be more widely adopted (Stanton, Lowe, Moffatt, & Del Mar, 2004).

We are aware of limitations of our study for three main reasons. First, there was a relatively high percentage (10.0%) of pregnant women's initial sample ($n = 18,633$) who did not self-identify their ethnicity. This might have biased the results of the study. Secondly, all pregnant women experienced a short minimal intervention for smoking cessation by their own MCHC nurses. Spontaneous cessation of smoking was reported by 28% in the USA among low-income pregnant women (Ockene et al., 2002). Without relevant data, we cannot estimate the potential for spontaneous cessation in our sample because all women received "something" (although the exact nature of the delivery of motivational interviewing was not measured). Third, outcomes of the multivariable analysis must be considered carefully because the individual decision for cessation is a result of numerous intellectual and emotional motivations based on past experiences. Additionally, each of our variables unifies many background factors in a simplified manner for practical reasons. It is true also for the ethnicity variable. Consequently, we believe that ethnicity should be part of the multiple factors that are considered when tailoring cessation interventions for pregnant women.

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