



Original research article

The prevalence of low birth weight (LBW) in marginalised Roma populations: a quantitative analysis in three segregated settlements of Szabolcs-Szatmár-Bereg County, Hungary

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Abstract

Objectives: This study examined the prevalence of low birth weight (LBW) among Roma women living in segregated settlements in Hungary and explored associated social and behavioural risk factors, with particular attention to health behaviours and access to antenatal care.

Design and participants: A cross-sectional quantitative survey was conducted with 231 Roma women from three segregated settlements in Szabolcs-Szatmár-Bereg County. Data were collected through structured, face-to-face interviews in the participants' home environment. **Methods:** The questionnaire included sociodemographic, behavioural, and antenatal care variables. Data were analysed using SPSS 25.0, with chi-square tests and binary logistic regression applied to identify determinants of LBW.

Results: The prevalence of low birth weight (LBW) was 13.4%. In bivariate analyses, smoking ($\chi^2 = 10.380, p = 0.001$), limited antenatal care attendance ($\chi^2 = 5.164, p = 0.023$), and vaginal infection ($\chi^2 = 7.030, p = 0.008$) were significantly associated with LBW, whereas alcohol consumption, drug use, and vitamin supplementation were not. In multivariable models, smoking showed a borderline association with LBW (AOR = 3.276, 95% CI 0.996–10.774, $p = 0.051$); other covariates were not significant.

Conclusion: LBW among Roma women in segregated communities appears to be shaped by modifiable behavioural and structural factors; priorities include culturally sensitive, community-embedded actions to reduce smoking and improve access to antenatal care. Further longitudinal research is warranted to confirm these associations and evaluate the effectiveness of targeted interventions.

Keywords: Antenatal care; Low birth weight; Roma women; Segregated communities; Smoking; Social determinants

Introduction

Birth outcomes are widely regarded as key indicators of both the quality of health care and the extent of social inequalities within a society (Szabó et al., 2023). Low birth weight (LBW) is not only a clinical concern but also a major public health and social policy challenge, particularly among socially excluded populations (FRA, 2014). Recent economic analyses also underline the substantial health and financial burden of very low birth weight, emphasising the importance of preventive interventions across countries (Ščasný et al., 2023). While recent economic analyses underline the substantial health and financial burden of very low birth weight, regional data indicate LBW rates between 8.7% and 13.5% among Roma populations in the Western Balkans, highlighting persistent

disparities in reproductive health (Grbic et al., 2024). In Hungary, the prevalence of LBW has remained at 8–8.5% in recent years, with socioeconomic and behavioural risk factors contributing substantially (Pauwlik and Fedor, 2025). Systematic reviews confirm that women from Gypsy, Roma, and Traveller communities experience disproportionately worse perinatal outcomes compared to the general population across Europe (Ekezie et al., 2024). Several studies confirm that disadvantaged groups, especially Roma women, are disproportionately affected by adverse perinatal outcomes, such as preterm birth and LBW (Balázs et al., 2014; Korniycki and Fedor, 2024; Kósa et al., 2011; Szabó and Veroszta, 2024; Watson and Downe, 2017). Socioeconomic disadvantage, including low educational attainment, unemployment, and housing deprivation, has a significant impact on maternal and neonatal health outcomes (Boros and Szabó, 2022; Ministry of Interior, 2025). Results

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show that individuals with lower education, poorer financial status, and limited digital access face greater difficulties in interpreting health information (Libicki et al., 2025).

Roma populations living in segregated settlements are particularly vulnerable to multiple risk factors that exacerbate pregnancy complications and neonatal health problems (Kósa et al., 2011; Ministry of Interior, 2025). National and international health policy documents emphasise the urgent need to reduce structural inequalities and to develop targeted interventions addressing the health of marginalized women (European Commission, 2021; FRA, 2014).

Health behaviours further contribute to this elevated risk profile. Higher rates of smoking during pregnancy, inadequate nutrition, and limited use of antenatal care have been documented among Roma women, increasing the likelihood of LBW and intrauterine growth restriction (Kósa et al., 2012; Szabó and Veroszta, 2023). Beyond physical barriers, institutional and communication gaps – such as limited cultural sensitivity in healthcare provision – further hinder Roma women's access to services (FRA, 2014; Ministry of Interior, 2025; Ščasný et al., 2023; Szabó and Boros, 2023). Furthermore, the well-being of healthcare providers themselves, such as midwives, can be compromised by workplace psychosocial factors, potentially affecting the quality of care provided to vulnerable populations (Major et al., 2024). Similar findings have been reported in Slovenia, where Roma women were found to have higher risks of preterm birth and LBW, partly due to lower utilisation of prenatal care services (Mihevc Ponikvar et al., 2023).

Although some national studies have addressed Roma maternal and child health, empirical data remain scarce, particularly regarding birth outcomes among women in segregated settlements, and only a limited number of quantitative studies have applied statistical analyses in this field. This lack of evidence not only restricts scientific understanding but also hampers the ability of public health policymakers to design culturally tailored interventions (Balázs et al., 2014; FRA, 2014; Kósa et al., 2012). Individual or structural experiences of discrimination, low health awareness, and negative attitudes towards the care system all reduce the likelihood of accessing health services (Szabó and Veroszta, 2023).

The lack of such evidence not only limits scientific understanding but also hampers the ability of public health policymakers to design culturally tailored interventions (Balázs et al., 2014).

Therefore, the aim of this study was to assess the prevalence of LBW among Roma women living in segregated settlements in Hungary and to identify key social and behavioural risk factors, with a particular focus on health behaviours and participation in antenatal care.

Materials and methods

Study design and participants

The study was a quantitative, cross-sectional research conducted in the autumn-winter period of 2024 in three segregated Roma communities in Szabolcs-Szatmár-Bereg County. The subjects for the study were selected through expert sampling, considering the aspects of spatial segregation, ethnic composition, and accessibility to the research sites. The women in the study were recruited through a personal approach using a structured questionnaire. Data was collected using a structured questionnaire, which was completed by participants during face-to-face interviews. Although the research did not follow an interview method, the personal presence resulted in

an interview-like data collection situation, which allowed for clarification and refinement of questions, and responding to the questionnaire was voluntary and anonymous. The final sample size consisted of 231 respondents.

Data collection and variables

The questionnaire contained a total of 297 mostly closed questions, which were compiled considering the relevant literature and the health priorities highlighted in national and international Roma strategies. The questions covered the following main thematic areas: sociodemographic background (age, education, economic activity, housing conditions), health behaviour (smoking, alcohol consumption, vitamin intake, substance use), participation in antenatal care and health conditions during pregnancy, birth outcomes, and gynaecological history.

Statistical analysis

Binary logistic regression was used to analyse the combined effect of health behaviour and sociodemographic factors. The statistical software SPSS 25.0 was used to perform the regression analyses, and the methodological protocol followed international guidelines (Laerd Statistics, n.d.; UCLA Institute for Digital Research and Education, n.d.). Among other factors, the model included maternal education, the prevalence of smoking and alcohol consumption, and attendance at care.

Frequency distributions, means, and standard deviations were calculated to describe the sample characteristics. In addition, multivariate binary logistic regression was used to explore the risk factors underlying low birth weight. The model included maternal age, education, smoking, alcohol consumption, drug use, vitamin intake during pregnancy, and antenatal care attendance as control variables. In all cases, a level of $p < 0.05$ was used to establish statistical significance.

Ethical considerations

The research was carried out in full compliance with the relevant data protection and research ethics regulations. Participants were fully informed, orally and in writing, about the purpose of the study, how the data would be handled, and how voluntary participation and anonymity were ensured. The study was approved by the Scientific and Research Ethics Committee of the Health Sciences Council (TUKÉB). TUKÉB File No: BM/2120-1/2024.

Results

Of the 231 women in the study, 31 (13.4%) reported having a low-birth-weight baby compared to their gestational age, of which 28 had one such outcome and 3 had more than one. The overwhelming majority of respondents, 198 (85.7%), negated that they had ever delivered a low-birth-weight baby, while 2 did not provide a meaningful response (Table 1).

Regarding smoking during pregnancy, 11 women (18.6%) admitted to regular smoking, 12 (20.3%) to occasional smoking during the pregnancy in which their low-birth-weight baby was born, and 36 (61%) said they had not smoked during this period. Data on the frequency of alcohol consumption showed that 13 women (41.9%) consumed alcohol occasionally, whereas another 13 (41.9%) said they had not consumed alcohol during pregnancy. In terms of antenatal care habits, 9 women (29.0%) with low-birth-weight babies attended antenatal care every month, 6 (19.4%) at least once a month, 14 (45.2%) only a few times, and 2 (6.5%) once or never (Table 2).

Table 1. Sociodemographic characteristics of participants

Variable	Category	n	%
Age (years)	Mean $\pm$ SD = 33.6 $\pm$ 11.6		
	<20	18	8.0
	20–29	78	34.5
	30–39	79	35.0
	≥ 40	51	22.6
Education level	<8 years of primary school	32	13.9
	Primary school (8 years)	156	67.5
	Vocational training	30	13.0
	Secondary school diploma	4	1.7
	Technical school diploma	4	1.7
	College/university	2	0.9
Employment status	Employed	138	59.7
	Unemployed	91	39.4
Housing	Municipal rental	85	36.8
	Living with relatives/friends	55	23.8
	Own property	41	17.7
	Private rental	11	4.8
	Other	2	0.9

With respect to pregnancy planning, 9 respondents (19.6%) reported that their pregnancy resulting in a low-birth-weight newborn was planned, while the majority, 37 women (80.4%), had an unplanned pregnancy. These results are consistent with national and international literature, indicating that the prevalence of low birth weight is higher in social groups characterised by higher smoking rates during pregnancy, alcohol consumption, low awareness of pregnancy planning, and irregular antenatal care attendance.

Table 2. Distribution of maternal behavioural factors

Variable	Category	n	%
Smoking during pregnancy	Did not smoke	36	61.0
	Smoked occasionally	12	20.3
	Smoked regularly	11	18.6
Alcohol consumption during pregnancy	Did not consume	13	41.9
	Occasionally	13	41.9
	Regularly	0	0.0
Antenatal care attendance	Once or never	2	6.5
	Only a few times	14	45.2
	At least once a month	6	19.4
	Every month	9	29.0
Pregnancy planning	Planned	9	19.6
	Unplanned	37	80.4

Bivariate associations

Chi-square tests were performed to examine potential associations between maternal risk factors and the prevalence of low birth weight (Table 3). A statistically significant association of moderate strength was observed for smoking (χ^2 (1) = 10.380, p = 0.001; Cramer's V = 0.253), antenatal care attendance (χ^2 (1) = 5.164, p = 0.023; Cramer's V = 0.171), and vaginal infection during pregnancy (χ^2 (1) = 7.030, p = 0.008; Cramer's V = 0.205). No significant association was found between alcohol consumption (p = 0.199), drug use (p = 0.199), or vitamin supplementation (p = 0.205) and low birth weight.

Table 3. Bivariate associations between maternal risk factors and low birth weight (chi-square test)

Variable	χ^2 (df = 1)	p -value	Cramer's V	Association
Smoking during pregnancy	10.380	0.001	0.253	s.
Vaginal infection during pregnancy	7.030	0.008	0.205	s.
Antenatal care attendance	5.164	0.023	0.171	s.
Alcohol consumption during pregnancy	1.646	0.199	0.180	n.s.
Drug use during pregnancy	1.646	0.199	n.s.	n.s.
Vitamin supplementation (folic acid)	1.603	0.205	n.s.	n.s.

Multivariate analysis – logistic regression

When all maternal factors were entered into the binary logistic regression model (Table 4), the associations weakened, and most factors did not remain statistically significant.

- Smoking during pregnancy showed a borderline significant association with low birth weight (OR = 3.276, 95% CI: 0.996–10.774, p = 0.051).
- Drug use during pregnancy was not significantly associated with low birth weight (OR = 1.535, 95% CI: 0.212–11.094, p = 0.671).

- Alcohol consumption during pregnancy was not significantly associated (OR = 1.439, 95% CI: 0.491–4.218, p = 0.507).
- Vitamin supplementation (folic acid) showed no protective effect (OR = 0.918, 95% CI: 0.322–2.613, p = 0.872).
- Vaginal infection during pregnancy was also not significantly associated (OR = 1.789, 95% CI: 0.552–5.802, p = 0.333).

Table 4. Adjusted odds ratios for factors associated with low birth weight

Variable	OR	95% CI (Lower–Upper)	p -value
Alcohol consumption during pregnancy	1.439	0.491–4.218	n.s.
Smoking during pregnancy	3.276	0.996–10.774	0.051
Drug use during pregnancy	1.535	0.212–11.094	n.s.
Vitamin supplementation (folic acid)	0.918	0.322–2.613	n.s.
Vaginal infection during pregnancy	1.789	0.552–5.802	n.s.

Summary of results

Overall, bivariate analyses (Table 1) indicated that smoking, irregular antenatal care, and vaginal infections were significantly associated with low birth weight. However, in the adjusted logistic regression model (Table 2), only smoking remained close to significance, suggesting that it is the most consistent correlate of low birth weight in this population. Sociodemographic and descriptive statistics are presented in Tables 3 and 4, while the distribution of birth outcomes is shown in Table 5.

Table 5. Prevalence of low birth weight among study participants

Outcome	<i>n</i>	%
Low birth weight (LBW)	31	13.4
Normal birth weight	198	85.7
Missing data	2	0.9

Discussion

According to the latest official data available, the proportion of low-birth-weight babies in Hungary was 8.5% in 2021. This rate refers to live-born babies with a birth weight of less than 2,500 grams (Hungarian Central Statistical Office, 2017).

The data from this research support the hypothesis that the prevalence of adverse perinatal outcomes, particularly low birth weight and preterm birth, among Roma women living in segregated settings is higher than the national average and are primarily rooted in social and behavioural determinants. The analyses clearly show that smoking, unconscious childbearing, and lack of vitamin intake and preventive behaviour contribute significantly to adverse outcomes. These correlations confirm previous national and international findings (FRA, 2014; Kósa et al., 2011; Szabó and Veroszta, 2023), which have emphasised the link between structural social disadvantages and health behaviour.

The prevalence of low birth weight showed a significant association with smoking, irregular antenatal care attendance, and vaginal infection during pregnancy. These associations are consistent with findings in the national and international literature that the increased presence of these risk factors characterises marginalised communities (European Foundation for the Care of Newborn Infants, 2021; Ohuma et al., 2023), and are further supported by participatory intervention research demonstrating the benefits of co-created antenatal resources among Roma women (Lie et al., 2023).

Logistic regression showed that smoking was the most consistent correlate of low birth weight, with a borderline significant effect. Lack of conscious childbearing was also a contributing factor, although this relationship only approached statistical significance. An analysis of vitamin intake patterns showed that although no significant protective effect was observed, intake rates increased during pregnancy, while preparatory vitamin intake in the preceding months remained markedly low, raising the issue of educational gaps in reproductive health (Herrera-Cuenca et al., 2024; Szabó et al., 2023). Rates of drug use were found to be low; however, the presence of occasional use does not exclude background risk (Kósa et al., 2012).

Although one focus of our research was the association between vaginal infections and low birth weight, the alarming increase in syphilis cases in Szabolcs-Szatmár-Bereg County cannot be overlooked. Clinical observations indicate that the prevalence of syphilis, particularly among women living in segregated settlements, has shown a marked increase in recent years. According to national data from the National Centre for Public Health (NNK), 1,070 syphilis patients were registered in Hungary in 2022, an increase of about 40% compared to 2018. The epidemiological trend was also upward in 2023, with 151 more cases of syphilis in 2023 than in the previous year. Based on this, there were approximately 1,221 syphilis cases nationwide in 2023 (for comparison, this is ~430 more than in 2019) (National Centre for Public Health and Pharmacy, 2024).

According to the quarterly reports of the National Centre for Public Health and Pharmacy, a total of about 63 syphilis cases were registered in Szabolcs-Szatmár-Bereg County in 2022, 19 of which occurred in the fourth quarter. In the year 2023, the number of cases in the county decreased to 45, of which 8 new cases were reported in the 4th quarter. For comparison, nationally, 1,069 cases of syphilis were recorded in 2022, and 1,220 in 2023 – of which 369 cases occurred in Q4 2023 (National Centre for Public Health and Pharmacy, 2024).

The trend is not only noteworthy from an epidemiological perspective, but also from a public health perspective – especially given the high rates of latent undetected cases and the increased risk in socially deprived communities, including the rise in sexual exploitation, prostitution, and congenital syphilis. Although the present study was not specifically designed to map the epidemiology of this infection, our empirical findings on the health status of communities living in segregated settlements support the social determinants and health policy relevance of this infection.

These findings confirm that the birth of low-birth-weight babies cannot be considered a purely biological or genetic trait. Socioeconomic factors, living environment, level of education, and access to care are complex determinants of the course and outcome of pregnancy (Ministry of Interior, 2025). Low levels of health awareness and limited participation in care among Roma women point to systemic problems that need to be addressed not only in health but also in social policy (European Commission, 2021).

It is important to underline that self-reported data may be biased due to the sensitivity of certain questions, particularly those related to smoking, alcohol, and the use of psychoactive substances. A further limitation is the cross-sectional research design, which does not allow causal inferences to be drawn. Nevertheless, the findings fit well with international trends and confirm the direction that improving health indicators among marginalised groups requires targeted, locally based, culturally sensitive interventions (FRA, 2014).

The findings confirm that, besides biological factors, sociocultural and structural factors play a major role in the development of low birth weight. Among disadvantaged Roma women, limited access to health care, unhealthy lifestyles, and social exclusion combine to influence perinatal outcomes (Hajdu et al., 2019; Szabó and Boros, 2023).

The use of longitudinal studies assessing the quality and continuity of antenatal care and the effectiveness of community-based health promotion programmes are priorities for future research. The results of the present study can serve as a basis for this, while drawing attention to the importance of a preventive approach.

Conclusion

The results of the present study confirm that the development of adverse perinatal outcomes, particularly low birth weight among Roma women living in segregated settings, is closely associated with certain health behavioural and social factors. Smoking was identified as the most consistent correlate of low birth weight, showing a borderline significant association, while the lack of conscious pregnancy planning was also associated with increased odds, albeit with marginal statistical significance.

Prenatal vitamin intake was low, particularly in the pre-pregnancy period, and although there was some increase during pregnancy, it remained below levels that support healthy foetal development. Although drug use was relatively rare, its presence in the cases concerned may have further increased perinatal risks.

The associations found clearly indicate that perinatal health among socially disadvantaged women is shaped not only by biological, but also by sociocultural and structural factors. The findings call for the development of culturally specific, community-based prevention and education interventions that effectively target health behaviours, conscious childbearing, and the promotion of participation in antenatal care.

This research may contribute to the development of social policy and public health strategies aimed at reducing health inequalities affecting Roma women and their children and at improving perinatal outcomes in this population in the long term. Therefore, interventions should follow a multilevel approach: at the community level, culturally sensitive programmes to reduce smoking and alcohol use, to promote conscious childbearing, and to engage local community mentors are required. Within the health system, strengthening the role of health visitors and community health workers, ensuring the regular availability of mobile screening services, and improving access to antenatal care are key priorities. At the policy level, these actions should be embedded in integrated, community-based health programmes that build on the collaboration between health, social, and educational sectors.

Author contributions

K.P.: full conceptualisation and design of the study, development of the questionnaire, organisation of data collection, guidance of statistical analysis, manuscript writing and finalisation. *G.M.*: professional consultation and support in literature background. *K.G.É.*: methodological input and proof-reading. *A.R.F.*: scientific supervision and final approval. All authors read and approved the final version of the manuscript.

Ethics approval and consent to participate

The study was approved by the Medical Research Council – Research Ethics Committee (TUKÉB), under approval number BM/2120-1/2024. All participants received full verbal information about the aims and procedures of the study and voluntarily agreed to participate. Due to the anonymised nature of the questionnaire and the absence of sensitive personal data, written informed consent was not required according to the approval of the ethics committee.

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Data availability statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest

The authors have no conflict of interest to declare.

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