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ORIGINAL ARTICLE

Relationship between socioeconomic characteristics and physical processes during pregnancy and labour

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Abstract

Aim An individual's socioeconomic status affects their living environment, conditions, and behavioural patterns. Research indicates that people with lower socioeconomic status experience higher rates of diseases and health issues. Studies have also shown a greater likelihood of pregnancy complications associated with factors such as low education, occupational status, and income. The aim of the present study is to determine the relationship between socioeconomic characteristics and physical processes during pregnancy and labour.

Subject and methods Between January and September 2023, an online cross-sectional survey was carried out among mothers living in Austria. The study examined demographic factors, assessed their financial and social status, and explored various aspects related to pregnancy and childbirth.

Results Our results show associations between the socioeconomic status of women—defined in this study by indicators such as education, subjective status location, and financial possibilities—and the need for medical treatment, such as for infections, gestational diabetes, and threat of premature birth. A low assessment of financial opportunities was found to be associated with an increased number of labour inductions, spinal anaesthesia, and caesarean sections. The lower the socioeconomic status, the worse the care and support during pregnancy and birth were rated.

Conclusion The findings indicate that a lower socioeconomic status is associated with adverse health outcomes during pregnancy and childbirth, as well as diminished satisfaction with healthcare. Education has been demonstrated to function as a protective factor; therefore, health literacy should be promoted.

Keywords Pregnancy · Obstetrics · Socioeconomic status

Theoretical background

The term 'socioeconomic status' (SES) is understood to denote an individual's 'social position', the determination of which is informed by a combination of indicators, including but not limited to educational attainment, income, and occupational status. It is evident that these socio-structural characteristics exert a considerable influence on the living conditions, opportunities, and behavioural patterns of individuals (Brand 2022; Baraka and Konstantinidis 2023). The unequal distribution of resources, opportunities for participation and competencies within a society leads to socially legitimised inequality. One specific example of this is health inequality, which is defined as the association between social status and mortality or morbidity (Staiger 2024). Classifying members of society into different social strata, each with their own material, psychosocial, and behavioural resources and conditions, affects health literacy and the ability to cope with illness (McCartney et al. 2013). In Western industrialised countries, there is an increasing emphasis on intangible resources such as cognitive abilities, social networks, and the capacity to manage health-related behaviour and lifestyle. These factors have the potential to elucidate existing health inequalities (Lampert et al. 2020).

In 2024, 16.9% of the total Austrian population was at risk of poverty or social exclusion. In the same year, 3.7%

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of the population was severely materially and socially deprived, unable to afford the minimum standard of living defined by the European Union (EU). Against this background, the risk of poverty and marginalisation was estimated at 21% for children and young people aged 0–17 years, and at 18% for women aged 18–34. A similar ratio is estimated for the proportion of pregnant women affected by poverty and social burden (Statistic Austria 2025).

A large number of research studies demonstrate that social status has a substantial effect on health, even in affluent, industrialised societies with comprehensive healthcare and social welfare systems. People from disadvantaged socioeconomic groups tend to be disproportionately affected by various health issues and tend to have a lower life expectancy. These disparities are largely attributed to constrained living conditions and limited opportunities for social participation. However, the findings also emphasise the protective effect of parental education, which can substantially offset the negative impact of limited resources on the health-related behaviours of children and adolescents (Höbel and Müters 2024; Lampert et al. 2016; Lampert and Kuntz 2019; Kuntz et al. 2018).

Numerous studies have shown that adverse socioeconomic factors, such as low educational attainment, unemployment, and limited income, are strongly associated with an increased risk of negative outcomes during pregnancy and childbirth. Compared to women of higher social and occupational status, those of lower status are at a higher risk of perinatal mortality, premature birth, low birth weight, pre-eclampsia, gestational diabetes, labour-induced haemorrhage, and caesarean section (Madden et al. 2025; Thomson et al. 2021; Mohamoud et al. 2019; Kim et al. 2018; Joseph et al. 2007; Peacock et al. 1995). A study by Miani et al. (2020) found that lower household income was associated with a higher likelihood of emergency caesarean sections. However, other studies have shown little to no association between socioeconomic indicators and low birth weight and preterm birth (Campbell et al. 2018) and other diseases during pregnancy and the neonatal period (Maher et al. 2023).

A study carried out at early life care centres in Austria showed that one third of women at risk of poverty reported negative experiences during pregnancy and childbirth. In this context, factors such as a lack of information, participation in decision-making processes, and respectful treatment were perceived as stressful (Weigl et al. 2024).

This study aims to investigate the relationship between socioeconomic characteristics and obstetrically relevant factors. The research focuses on two main areas. The first part investigates subjective feelings and symptoms experienced during pregnancy and has already been published (Schildberger et al. 2025). The second part, presented here, addresses the following question:

To what extent are physical processes during pregnancy and labour, the subjective experience of care during birth, and social stratification related?

Methods

An online cross-sectional survey was conducted from January to September 2023 using a questionnaire that had been pre-tested with 20 respondents to improve its comprehensibility and readability. The questionnaire was prepared using the online survey application LimeSurvey, which was promoted in German-language forums, online platforms, networks, and print media. The target group comprised women whose youngest child was born no more than 5 years ago. Consent to participate was obtained, and information about data protection was provided.

Survey instrument

The survey instrument contains questions on demographic characteristics, the categorisation of the financial and social situations, and aspects relevant to pregnancy and childbirth:

Demographic characteristics (13 items):
Women's age, education, parents' origin, marital status, and birth history (number and age of children, number of miscarriages and premature births).
Assessment of the financial situation (19 items):
Based on the EU-SILC [statistics on income and living conditions] (Statistik Austria 2024), it asks about details of household equipment (e.g. TV, internet, telephony, washing machine, private car) as well as financial opportunities (e.g. hot meals, clothing, rent and running costs, holidays, and adequate heating of the home).
Life satisfaction and subjective social status: two questions from the 'Gesundheit in Deutschland aktuell' study (Robert Koch-Institut 2017), in which respondents rate their social status on a scale from 0 (not at all satisfied/very poor) to 10 (completely satisfied/very good).
Medical treatment due to complications during pregnancy (9 items): e.g. premature labour, vaginal bleeding, infections, and hypertension requiring medical treatment.
Interventions during the last birth (7 items): e.g. induction of labour, vacuum extraction, or episiotomy.
Subjectively assessed quality of care during birth (9 items): statements, for example, on medical care, the opportunity to participate in labour, and the comprehensibility of information.

Statistical analysis

Following a plausibility check (with regard to factors such as age and content consistency), 735 completed questionnaires were included in the analysis. Because of differences in preventive and medical services across countries, the analysis is limited to participants residing in Austria.

Data analysis was carried out using the R Statistical Software Package (R Foundation for Statistical Computing 2025) and IBM SPSS Statistics (IBM 2023).

Due to the non-normal distribution of the data (as determined by the Kolmogorov–Smirnov test with Lilliefors significance, $\alpha = 10\%$), the point biserial Spearman rank correlation coefficient was used to calculate the correlation between SES characteristics and obstetric intervention indicators, and to assess care during labour.

Again, due to the non-normal distribution of the data, the Mann–Whitney U test was used to compare the characteristics of academics and non-academics after the education variable had been dichotomised. Fisher's exact test was used to compare dichotomous characteristics, while the exact chi-square test was used to compare the other nominal characteristics.

All statistical statements are purely descriptive, and no type I error adjustment was performed.

Question batteries were summarised into sum scores where this made sense in terms of content. This summarised presentation was used for the stratification characteristics 'household facilities' and 'financial opportunities', as well as 'undergoing medical treatment during pregnancy'.

Sociodemographic characteristics

Table 1 presents an overview of the sociodemographic characteristics of the women surveyed (Schildberger et al. 2025).

The average age of the surveyed women was 32.5 years (±5.10). Most (97.4%) lived in a partnership, with only a small minority being single, divorced, or separated. Nearly half (48.7%) had completed a university degree, while 22.9% held an upper secondary school qualification, 10.75% a vocational secondary school qualification, and 16.1% an apprenticeship. A negligible 1.6% had neither compulsory education nor vocational training.

Only a small proportion were born outside Austria (3.7% in Germany, 6.7% elsewhere, mainly Bosnia-Herzegovina, Turkey, North Macedonia, and Serbia). A migration background was found in 14% of the sample.

On average, women had 1.53 children (±0.75). Additionally, 27.8% had experienced at least one miscarriage or stillbirth, and 10% reported a premature birth. Social stratification was assessed based on education, household facilities, financial opportunities, life satisfaction, and perceived social status.

Household facility scored an average of 9.77 (±0.68), varying by education level—academics scored 9.86 (±0.54), while non-academics scored 9.67 (±0.78). Financial means followed a similar trend, with academics reporting higher financial resources (9.71 ± 0.88) than non-academics (8.94 ± 1.82).

Life satisfaction was rated at 8.2 (±1.57), while perceived social status averaged 6.4 (±1.43). Higher education was associated with better outcomes: women with university degrees reported higher life satisfaction (8.5 ± 1.29) and social status (6.97 ± 1.27), highlighting an ongoing research focus on the relationship between education and quality of life.

Results

The results are structured into the following categories:

1. Need for medical treatment during pregnancy
2. Interventions sub partu
3. Subjective assessment of the quality of care and support during labour and birth

These aspects are analysed in the context of socioeconomic factors by comparing indicators such as life satisfaction, social status, household resources, financial opportunities, and academic and non-academic levels of education.

Need for medical treatment during pregnancy

The data collected from the surveyed women on medical treatment due to various pregnancy-related issues indicate a negative correlation between the frequency of consultations and the overall assessment of life satisfaction ($r = 0.19$, $p < 0.001$***) and personal categorisation of the social situation ($r = 0.10$, $p = 0.010$*). This diametrical correlation is also evident in the indicators of household facilities ($r = 0.12$, $p = 0.003$**), financial opportunities ($r = 0.16$, $p < 0.001$***), and educational qualifications ($r = 0.11$, $p = 0.005$**).

Lower life satisfaction was shown to be associated with a higher frequency of medical consultations for infections ($r = 0.16$, $p < 0.001$***), diabetes mellitus/gestational diabetes ($r = 0.12$, $p = 0.001$**), premature labour or threat of premature birth ($r = 0.10$, $p = 0.012$*), and other issues ($r = 0.12$, $p = 0.003$**) during pregnancy.

The treatment of hypertension was found to be related to how individuals perceive their social situation ($r = 0.12$, $p = 0.002$**).

Furthermore, an association was identified between lower household income and an increased frequency of treatment due to infections ($r = 0.09$, $p = 0.019$*).

Table 1 Study characteristics (Schildberger et al. 2025)

Highest level of education completed	Absolute	Relative (%)		
No school education	1	0.14		
Basic education	11	1.5		
Apprenticeship	118	16.05		
Vocational secondary school without general higher education entrance qualification	79	10.75		
Upper secondary school with higher education entrance qualification	168	22.86		
University, university of applied sciences, academy **(= academics)**	**358**	**48.71**		
Non-academics[a]	**377**	**51.29**		
Age in years	Total (722)	Academics (353)	Non-academics (369)	Academics/non-academics (MWU[f])
Mean (SD)	32.5 (5.10)	34.08 (4.38)	30.98 (5.27)	**< 0.001**
Median (Min/Max)	32 (16/53)	34 (23/53)	31 (16/47)	
Marital status (absolute and relative in %)	Total (735)	Academics (358)	Non-academics (377)	Academics/non-academics (Fisher[f])
In partnership (incl. married)	716 (97.41)	353 (98.60)	363 (96.29)	0.062
Separated, divorced, or single	19 (2.59)	5 (1.4)	14 (3.71)	
Country of birth (absolute and relative in %)	Total (735)	Academics (358)	Non-academics (377)	Academics/non-academics (Chi[f])
Austria	659 (89.66)	330 (92.18)	329 (87.27)	**< 0.001**
Germany/Switzerland	27 (3.67)	16 (4.47)	11 (2.92)	
Other country	49 (6.67)	12 (3.35)	37 (9.81)	
Origin-country of women's mother (absolute and relative in %)	Total (735)	Academics (358)	Non-academics (377)	Academics/non-academics (Chi)
Austria	630 (85.71)	319 (89.11)	311 (82.49)	**< 0.001**
Germany/Switzerland	34 (4.63)	20 (5.59)	14 (3.71)	
other country	71 (9.66)	19 (5.31)	52 (13.79)	
Origin-country of women's father (absolute and relative in %)	Total (735)	Academics (358)	Non-academics (377)	Academics/non-academics (Chi)
Austria	629 (85.58)	320 (89.39)	309 (81.96)	**< 0.001**
Germany/Switzerland	31 (4.22)	18 (5.03)	13 (3.45)	
Other country	75 (10.2)	20 (5.59)	55 (14.59)	
Number of children	Total (734)	Academics (358)	Non-academics (376)	Academics/non-academics (MWU)
Mean (SD)	1.53 (0.75)	1.47 (0.74)	1.59 (0.75)	**0.028**
Median (Min/Max)	1 (0/5)	1 (0/4)	1 (0/5)	
Life satisfaction[b]	Total (705)	Academics (348)	Non-academics (357)	Academics/non-academics (MWU)
Mean (SD)	8.20 (1.57)	8.50 (1.29)	7.91 (1.75)	**< 0.001**
Median (Min/Max)	8 (1/10)	9 (1/10)	8 (1/10)	
Social status[c]	Total (705)	Academics (348)	Non-academics (357)	Academics/non-academics (MWU)
Mean (SD)	6.44 (1.43)	6.97 (1.27)	5.92 (1.40)	**< 0.001**
Median (Min/Max)	7 (1/10)	7 (3/10)	6 (1/10)	
Household facilities[d]	Total (735)	Academics (358)	Non-academics (377)	Academics/non-academics (MWU)
Mean (SD)	9.77 (0.68)	9.86 (0.54)	9.67 (0.78)	**< 0.001**
Median (Min/Max)	10 (3.75/10)	10 (3.75/10)	10 (3.75/10)	
Financial opportunities[e]	Total (716)	Academics (352)	Non-academics (364)	Academics/non-academics (MWU)
Mean (SD)	9.32 (1.48)	9.71 (0.88)	8.94 (1.82)	**< 0.001**
Median (Min/Max)	10 (0.91/10)	10 (4/10)	10 (0.91/10)	

Marking *p*-values: ***p* < 0.05**

[a] Dichotomisation as the basis for the following presentation

[b] Question: In general, how satisfied are you with your life? Please answer from 10 (completely satisfied) to 1 (not satisfied at all)

[c] Question: Imagine a ladder with 10 rungs to show where the people in your country stand. At the top are the people with the most money, the best education and the best jobs. At the bottom are those with […] The higher you are on the ladder, the closer you are to the people at the top; the lower you are, the closer you are to the people at the bottom. Where would you place yourself on the ladder? […]

[d] Total score (cut-off value ≥ 4), 8 items (e.g. mobile phone, TV, PC, car, washing machine, …) with question: Does your household have …? Answer categories: yes; no, not possible for financial reasons; no, the household does not want this

[e] Total score (cut-off value ≥ 6), 11 items (e.g. holiday, hot meal, clothes, hairdresser, rent, …) with question: If you want to, can you afford…? Answer categories: yes; no, not possible for financial reasons; no, I don't want to

[f] MWU = Mann–Whitney-U test; Fisher = Fisher's exact test; Chi = exact chi-square test

Women who reported having fewer financial opportunities were more likely to have received treatment for premature labour or threatened preterm birth ($r=0.11$, $p=0.004$**), premature rupture of the membranes ($r=0.10$, $p=0.007$**), iron deficiency ($r=0.09$, $p=0.025$*), and other issues ($r=0.08$, $p=0.048$*).

Those without an academic degree were more likely to have undergone treatment for infection ($r=0.08$, $p=0.031$*).

Treatment for intrauterine growth restriction (IUGR) and vaginal bleeding during pregnancy were not associated with the social indicators considered in the study (Table 2).

Interventions sub partu

The information provided by women regarding interventions during birth is partly related to the financial opportunities and educational level of the study cohort, but not to assessments of life satisfaction, social situation, or household facilities. The findings of the study indicate that lower financial opportunities are associated with obstetric interventions, including induction of labour ($r=0.11$, $p=0.007$**), epidural and spinal anaesthesia ($r=0.12$, $p=0.003$**), and caesarean section ($r=0.12$, $p=0.008$**). In addition, evidence is presented demonstrating an association between a lower level of education and induction of labour ($r=0.08$, $p=0.038$*) (Table 2).

Subjective assessment of the quality of care and support during birth

All aspects of subjective assessment of quality of care and support during birth show an association with socioeconomic characteristics and life satisfaction. The findings of the survey indicate that lower life satisfaction, a lower social situation, limited household facilities, and fewer financial opportunities are associated with a poorer assessment of quality care and support. The survey results also suggest that the consideration of wishes and expectations during and after birth is related to these factors. The level of education of the women surveyed is related to their perception of the comprehensibility and appropriateness of the information provided on leaving the clinic (Table 2).

Discussion

The findings of this study demonstrate the association between the stratification variables and pregnancy- or obstetric-related variables.

The number of medical consultations due to pregnancy-related complications also demonstrated a relation with individually assessed life satisfaction and socioeconomic situation. Obvious connections were observed with symptoms of infection during pregnancy, diabetes mellitus, premature labour, and premature rupture of the membranes. Without adequate treatment, these diagnoses would be associated with an increased likelihood of premature births, small-for-gestational-age (SGA) newborns, and stillbirths. This finding is consistent with the perinatal outcome parameters identified by Novillo-Del-Álamo et al. (2024) as a consequence of poverty in their review of 46 studies.

Reduced financial opportunities are related to an increasing rate of obstetric interventions, induction of labour, epidural spinal anaesthesia, and caesarean section. This phenomenon appears to be a rational outcome of the complications that arise during pregnancy, which necessitate a greater degree of intervention during labour.

The correlation between the subjective ratings of life satisfaction, social status, household resources, financial opportunities, and the evaluation of support services during pregnancy and childbirth was found to be substantial. This finding aligns with theories that recognise the opportunities for participation and access to healthcare and social support services as social determinants of health inequality. Furthermore, the results of this study demonstrate a substantial association between the educational attainment of women and their capacity to process and comprehend pertinent information. This finding suggests that educational status may serve as a gradient of health literacy. In this instance, too, clear parallels can be drawn with the findings of Mantwill (2022). Similarly, we confirm Lampert et al.'s (2020) hypothesis that cognitive abilities, social networks, and the ability to manage health-related behaviour and lifestyle are becoming increasingly important.

Summary and conclusions

The results of the study indicate that the SES of women, as determined by their level of education, social status, and financial opportunities, has a negative influence on the physiological processes during pregnancy and labour. A relation was demonstrated between lower social status and an increase in the number of diseases requiring treatment during pregnancy, the rate of labour inductions, caesarean sections, and epidurals, and a decrease in satisfaction with the quality of care and support. Educational status was shown to serve as a protective factor for all of the items under consideration. In light of the escalating pressures faced by the Austrian healthcare system, the promotion of adequate health literacy within the populace is regarded as imperative.

Limitation

Because of the large number of women with a tertiary education participating in the survey, the education variable

Table 2 Presentation of results

		Life satisfaction	Social status	Score household facilities	Score financial opportunities	Education (non-academic vs academic)[e]
Medical treatment during pregnancy[a]	***n***	***r***	***r***	***r***	***r***	***r***
Score: undergoing medical treatment during pregnancy[b]	664–667	0.19 (***)	0.10 (*)	0.12 (**)	0.16 (***)	0.11 (**)
Preterm labour, risk of preterm birth	662–665	0.10 (*)	0.01	0.05	0.11 (**)	0.07
Premature rupture of membranes	662–665	0.07	0.01	0.05	0.10 (**)	0.06
Vaginal bleeding during pregnancy	663–666	0.01	0.00	0.06	0.04	0.01
Infection (e.g. cystitis)	664–667	0.16 (***)	0.05	0.09 (*)	0.05	0.08 (*)
IUGR (insufficient growth of the unborn baby)	661–664	0.03	−0.00	0.03	0.02	0.04
Hypertension	662–665	0.05	0.12 (**)	0.04	0.07	0.07
Diabetes mellitus or gestational diabetes	662–665	0.12 (**)	0.06	0.05	0.07	0.04
Iron deficiency	663–665	0.07	0.03	0.06	0.09 (*)	0.07
Other problems not listed	634–637	0.12 (**)	0.03	0.03	0.08 (*)	−0.03
Interventions during labour[c]	***n***	***r***	***r***	***r***	***r***	***r***
Induction of labour	629–632	0.04	0.07	0.03	0.11 (**)	0.08 (*)
Infusion to stimulate or labour	627–630	−0.04	0.03	0.03	0.02	0.00
Infusions for pain relief	622–625	0.03	0.06	0.04	0.06	0.03
Epidural/spinal anaesthesia	629–632	0.02	0.07	0.04	0.12 (**)	−0.03
Episiotomy	629–631	0.04	0.01	0.03	−0.03	0.06
Vacuum extraction	632–635	0.01	−0.00	0.01	−0.02	−0.02
Caesarean section	632–635	−0.01	0.00	0.07	0.11 (**)	0.00
Subjective assessment of the quality of care during birth[d]	**n**	***r***	***r***	***r***	***r***	***r***
I felt well looked after by the midwife during the birth	626–628	−0.10 (*)	−0.08 (*)	−0.09 (*)	−0.15 (***)	0.04
I felt well looked after by the doctors during the birth	582–585	−0.19 (***)	−0.08	−0.03	−0.06	0.02
My wishes and ideas were considered during the birth	603–606	−0.14 (**)	−0.15 (***)	−0.04	−0.16 (***)	−0.06
I was told what was happening during the birth	625–628	−0.09 (*)	−0.11 (**)	−0.05	−0.07	0.01
The birth went exactly as I had imagined	616–619	−0.20 (***)	−0.15 (***)	−0.06	−0.13 (**)	0.00
The information about breastfeeding was helpful	582–585	−0.07	−0.08 (*)	−0.09 (*)	−0.08	−0.07
The nurses/midwives at the hospital were kind and helpful	595–598	−0.13 (**)	−0.1 (*)	−0.08 (*)	−0.07	−0.04
The information given when I left hospital was easy to understand	586–589	−0.17 (***)	−0.10 (*)	−0.10 (*)	−0.09 (*)	−0.12 (**)
Overall, I have fond memories of the birth of my last child	631–634	−0.20 (***)	−0.08 (*)	−0.02	−0.12 (**)	0.02

r = Spearman's correlation coefficients (*$p < 0.05$. **$p < 0.01$. ***$p < 0.001$) translation for easy readability

[a] Question 'Did you receive medical treatment for the following problems during your last pregnancy?' with answer categories yes, no

[b] Sum score 1–10. Higher values mean a lower number of treatments

[c] Question 'Which of these measures were needed when your last child was born?' with answer categories yes, no, don't know

[d] Question 'Which statements apply to your last birth?' with answer categories not enough to very good

[e]Dichotomised variable of education

was dichotomised during the analysis of the data. While this allows comparisons to be made between women with and without academic qualifications, it limits the ability to conduct a more nuanced analysis based on educational background.

The selection and categorisation of obstetric aspects were primarily shaped by the participants' perceptions and memory. Consequently, the reported pregnancy-related issues and birth complications do not reflect epidemiological case numbers but represent a subjective selection of experiences within the context of sociodemographic factors.

While the stratification indicators used in the analysis are suitable for identifying correlations, they do not allow for explanatory conclusions, only plausible assumptions.

Another limitation is that the survey instrument was only available in German.

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Data Availability All data generated or analysed within the context of this study are included in this article and in the previously published article '' The association between socioeconomic factors and obstetric dimensions in pregnancy: an online cross-sectional study''.

Declarations

Ethics approval Ethical approval was granted by the Institutional Ethics Board of the University of Applied Sciences for Health Professions Upper Austria.

Conflict of interest The authors have no competing interests to declare that are relevant to the content of this article.

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