Thieme

Perinatal Outcome in Women with a Vietnamese Migration Background – Retrospective Comparative Data Analysis of 3000 Deliveries

Perinatales Outcome bei Frauen mit vietnamesischem Migrationshintergrund – retrospektive vergleichende Datenauswertung von 3000 Geburtsverläufen

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ABSTRACT

Introduction Perinatal data of women with a Vietnamese migration background have not been systematically studied in Germany to date. Numerous details of important maternal and child outcomes were compared and analysed. The study's primary parameters were the frequency of and indication for c-section.

Methodology The perinatal data from a Berlin hospital were analysed retrospectively. The women (Vietnamese migration background vs. autochthonous) were grouped using name analysis. Datasets of 3002 women giving birth, including 999 women with a Vietnamese migration background, were included. The associations between primary or secondary cesarean delivery and different child outcomes depending on the migration background (exposure) were studied using logistical regression analysis.

Results Women with a Vietnamese migration background have a lower c-section rate of 8.0% for primary and 12.6% for secondary c-section than women without a migration background (11.1% primary and 16.4% secondary c-section respectively). Regression analysis shows that the odds that women with a Vietnamese migration background will have a primary (OR 0.75; p = 0.0884) or secondary c-section (OR 0.82; p = 0.1137) are not significantly lower. A Vietnamese migration background was associated with higher odds for an episiotomy but not for a grade 3–4 perineal tear. A Vietnamese migration background does not have a significant influence on poor 5-min Apgar scores ≤ 7 and low umbilical cord arterial pH values ≤ 7.10. Newborns of mothers with a Vietnamese migration background have higher odds of a relatively higher birth weight (> 3110 g).

Summary There was no evidence that women with a Vietnamese migration background are delivered more often by caesarean section. There were also no differences as regards important child outcome data from women in the comparator group. Overall, the results do not provide any evidence for poorer quality of care of women with a Vietnamese migra-

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tion background in Berlin despite the cultural and communication barriers in the reality of care provision.

ZUSAMMENFASSUNG

Einleitung Perinataldaten von Frauen mit vietnamesischem Migrationshintergrund wurden in Deutschland bisher nicht systematisch untersucht. Zahlreiche Angaben zu wichtigen mütterlichen und kindlichen Outcomes wurden vergleichend analysiert. Hauptzielparameter der Studie waren Häufigkeit und Indikationsstellung von Sectios.

Methodik Die Perinataldaten einer Berliner Klinik wurden retrospektiv ausgewertet. Die Gruppenzuordnung der Frauen (vietnamesischer Migrationshintergrund vs. autochthon) erfolgte mittels Namensanalyse. Datensätze von 3002 Gebärenden, darunter 999 Frauen mit vietnamesischem Migrationshintergrund, konnten eingeschlossen werden. Mittels logistischer Regressionsanalysen wurden u. a. die Zusammenhänge zwischen primärer bzw. sekundärer Sectio sowie verschiedenen kindlichen Outcomes in Abhängigkeit vom Migrationshintergrund (Exposition) untersucht.

Ergebnisse Frauen mit vietnamesischem Migrationshintergrund haben mit 8,0% primären und 12,6% sekundären Sectios eine geringere Sectiohäufigkeit als Frauen ohne Mi-

grationshintergrund (11,1% primäre resp. 16,4% sekundäre Sectio). Die Regressionsanalysen zeigen für Frauen mit vietnamesischem Migrationshintergrund eine statistisch nicht signifikant geringere Chance einer primären (OR 0,75; p = 0,0884) und einer sekundären Sectio (OR 0,82; p = 0,1137). Ein vietnamesischer Migrationshintergrund war mit einer höheren Chance für einen Dammschnitt, nicht aber für einen Dammriss 3./4. Grades verbunden. Ein vietnamesischer Migrationshintergrund hat keinen signifikanten Einfluss auf ungünstige 5-min-Apgar-Werte ≤ 7 und ungünstige arterielle Nabelschnur-pH-Werte ≤ 7,10. Neugeborene von Müttern mit vietnamesischen Migrationshintergrund haben eine höhere Chance eines relativ höheren Geburtsgewichts (> 3110 g).

Zusammenfassung Es fand sich kein Hinweis, dass Frauen mit vietnamesischem Migrationshintergrund häufiger per Kaiserschnitt entbunden werden. Auch hinsichtlich wichtiger kindlicher Outcome-Daten zeigten sich keine Unterschiede zu Frauen der Vergleichsgruppe. Insgesamt geben die Ergebnisse keine Hinweise auf eine schlechtere Betreuungsqualität von Frauen mit vietnamesischem Migrationshintergrund in Berlin trotz in der Versorgungsrealität vorhandener Kultur- und Kommunikationsbarrieren.

Introduction

Migrant women account for a steadily increasing proportion of those giving birth in many Western industrialised countries. There is no generic "migrant woman"; the heterogeneous migration history, health status, knowledge and expectations regarding pregnancy and delivery depending on ethnic or regional origin must be considered [1, 2]. Approximately 165 000 persons with a Vietnamese migration background live in Germany, and about half of them have German citizenship. Of the 165 000 people of Vietnamese origin, roughly 104 000 were immigrants (first migration generation) and about 61 000 do not have direct experience of migration themselves (second and third generation) [3].

Immigration from Vietnam began in significant numbers after the end of the Vietnam war and the unification of North and South Vietnam. Two large groups of Vietnamese migrants came to the Federal Republic of Germany (FRG) and the German Democratic Republic (GDR) between 1975 and 1986. The "boat people" or quota refugees (BRD) and the "contract workers", who were recruited by the GDR in the 1980s [4, 5]. Since 1990, Vietnamese men and women have immigrated mainly for family reunification (members of both of the aforementioned groups) or as asylum-seekers. From 1998 till 2009, Vietnam was one of the ten countries of origin with the highest rate of asylum seekers [5], but Vietnamese immigrants are now in 28th place in the Federal Statistics Office's statistics regarding foreigners [6]. A detailed description of the migration history of Vietnamese to Germany can be found in Schaland and Schmiz (2015), Hillmann (2005) and Dennis (2007) [5, 7, 8]. The average age of the Vietnamese citizens in Germany is 37.1 years; the average duration of residence in Germany of Vietnamese migrants with personal migration experience is 15.5 years [5].

International studies show that unfavourable socio-economic circumstances associated with migration, differences in care in pregnancy and delivery, communication difficulties, cultural and also as yet poorly understood biological factors can lead to more premature births, increased perinatal mortality or an increased frequency of operative deliveries in migrant women [9–11].

A series of English-language publications on obstetric parameters in Vietnamese migrants have appeared worldwide in the last 15 years [12]; their main, though sometimes controversial results can be summarised as follows:

1. Articles from Switzerland, New Zealand and Australia have recently shown a higher rate of secondary c-section [13–15], while other studies from Australia, Norway, Taiwan and the USA describe lower odds overall that Vietnamese migrants will be delivered by c-section compared with local women [16–22].

2. In some studies, a markedly higher prevalence of gestational diabetes (GDM) is reported in Vietnamese migrants [2, 18, 23], whose children (nevertheless) are overall significantly lighter at birth than the children of the comparative groups of non-migrants [17, 24, 25].

3. Trinh et al. (2013) report a significantly higher episiotomy rate in Vietnamese compared with Australian women without a migration background [26].

4. In a systematic literature review, Wheeler et al. (2012) describe Asian origin as an independent risk factor for severe perineal injuries in migrant women in Western countries [27].

Unlike in other European countries, very few studies have been conducted to date in Germany on the subjects of care of migrant women in pregnancy, delivery and on the perinatal data of

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migrant women or women with a migration background, although this subject plays a major role in real hospital practice in large cities and industrial conurbations. No study results have been published so far in Germany on perinatal outcomes in women with a Vietnamese migration background. Stimulated by the partly controversial research results in the international literature, our analysis examines whether women in Germany with a Vietnamese migration background develop gestational diabetes more often than non-migrants and whether arrested labour, severe perineal injuries and secondary caesarean section occur more often due to anatomical features (average lower height). Language difficulties and the influence of sociocultural factors might have an unfavourable effect on perinatal outcomes. This raised the following specific questions for research regarding women with a Vietnamese migration background vs. non-migrant women: is there a difference in the frequency of primary and secondary c-section? (main question, basis for case number calculation). Secondary questions:

1. Is there a difference in the indications for c-section?
2. Is there a greater weight gain in pregnancy and a higher number of cases of GDM in women with a Vietnamese migration background?
3. Do babies of women with a Vietnamese migration background have a higher or lower birth weight?
4. Are there differences in the episiotomy rate and the rate of severe, grade 3 and 4 perineal tears?
5. Are there differences in the 5-min Apgar score or umbilical cord arterial pH of the newborns?
6. Are newborn babies of women with a Vietnamese migration background transferred more often post partum to a children's hospital?

Patients and Methods

Study population

The study population was collected at the Berlin hospital Vivantes Klinikum im Friedrichshain. A large proportion of Vietnamese migrant women in Berlin have been delivering there for years, which is attributable especially to the hospital's location. As a result of the historical developments in Berlin, the Vietnamese residential population is concentrated largely in the eastern part; most people with a Vietnamese migration background live in Marzahn and Lichtenberg, with some living in Hohenschönhausen [28].

According to the case number calculation, a study population of about 1000 Vietnamese pregnant women were needed to answer the main question (c-section frequency). To increase the power of the study, two women were allocated to each woman with a migration background (study population) to form a comparative group (the non-migrant entered before and after each migrant in the delivery register).

This gave an overall study population in which one third consisted of women with a Vietnamese migration background (study population; n = 1000) and two thirds of non-migrant women (comparative population; n = 2000). The data capture was based on the delivery registers for the period February 2010 to June

2015 and the PC-supported delivery documentation system of the aforementioned maternity hospital.

Inclusion and exclusion criteria

Women with multiple pregnancy, termination of pregnancy (regardless of week of pregnancy) and/or incomplete documentation were excluded.

Migration background

Women were assigned to the two groups (women with a Vietnamese migration background and women without a Vietnamese migration background, here designated as non-migrants in the context of the present study) based on name analysis [29 – 33].

Name analysis has been used in medicine and related disciplines since the 1980s for migration and public health research [34 – 37] as names from certain regions point highly specifically to the regional or ethnic origin of the bearer of the name [38, 39]. For example, Lauderdale (2006) used a name list of all socially insured persons for screening for women of Arab origin in Californian birth registers [39]. Shin and Yu (1984) and Rosenwaike (1994) dealt explicitly with the name analysis of Asian migrant groups in the US [40, 41].

In Vietnam there are only about 300 family names [38]. Almost 92 % of Vietnamese have one of the 14 most common Vietnamese family names [42]. Vietnamese first and family names allow relatively safe identification of persons of Vietnamese origin and can be distinguished readily from names from other regions, especially those of other Asian migrant groups [42]. Examples of group allocation through Vietnamese names and corresponding research projects can be found in Taylor et al. (2011) and in Novotny and Cheshire (2012) [43, 44].

The name analysis for our study was performed by a Vietnamese native speaker and by another person independently of one another. Only women with a clearly Vietnamese first *and* family name were included in the study. In the few unclear cases, women who could not be clearly assigned were not included in the analysis. Allocation to the groups by name analysis was reinforced by the information in the hospital perinatal record (nationality key in the PC documentation). Accordingly, only women with German nationality were allocated to the non-migrant group (autochthonous comparative population).

Data protection

The study was conducted after detailed consultation in and with the agreement of the joint institutional board of the two hospitals involved in the study preparation and data analysis. The Charité charter on ensuring good scientific practice and the regulations of the Berlin data protection law and of the Vivantes clinics were observed.

Statistics and group formation

The main and secondary questions were studied using descriptive analysis as well as linear and logistical regression models. For the main question regarding differences in the rates of primary and secondary c-section, in addition to the migration status, the logistical regression models included the following determinants: age (18–24 years, 25–29 years, 30–34 years, 35 years and older), gestational diabetes (yes/no), body mass index (BMI) (< 25 kg/m^2;

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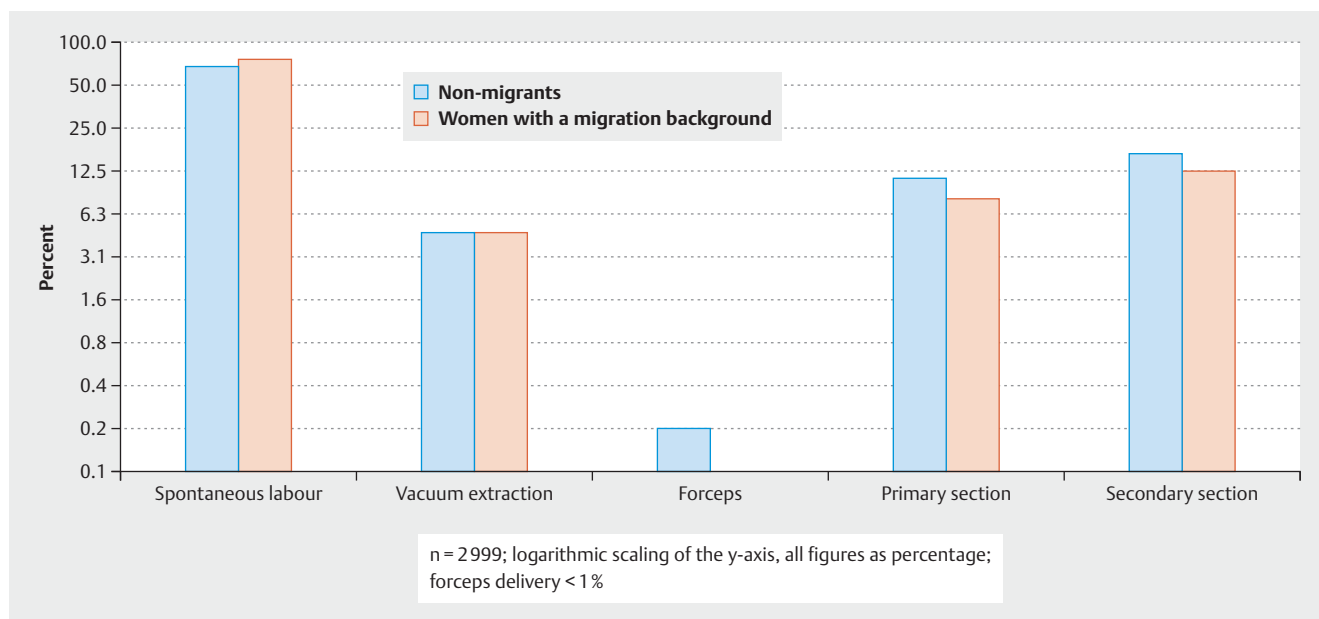
▶ **Fig. 1** Mode of delivery of women with a Vietnamese and without a migration background, Berlin 2010–2015.

< 30 kg/m^2; ≥ 30 kg/m^2), number of antenatal visits (0–9; 10 or more) and the time of the first antenatal visit (week 0–10; 11–20; 21 and later). The pregnant women's weight gain was determined by the difference in BMI at the start of the pregnancy (during the first antenatal visit) and the BMI before delivery. The differences between Vietnamese women and the comparative group were determined in a linear regression analysis with the outcome "difference in BMI" and adjusted for the confounder age (four age groups) and the predictor gestational diabetes.

For the descriptive analyses and logistical models, the outcomes "5-min Apgar scores" and "umbilical cord arterial pH values" were dichotomised (Apgar scores 0–7 vs. 8–10 and pH values ≤ 7.10 vs. > 7.10). Besides the migration status, the regression analyses included the confounders age (four age groups), parity (nullipara vs. multipara), delivery mode (vaginal, VE, primary c-section, secondary c-section), premature delivery (yes/no), presentation (cephalic yes/no), birth weight ≤ 2900 g (corresponding to 20th percentile – yes/no).

The influence of migration on birth weight was analysed with a logistical regression model. For this, the outcome birth weight was dichotomised using the median (< 3310 vs. ≥ 3310 g). Since women with a Vietnamese migration background are smaller on average than non-migrants (mean: 156.1 vs. 167.6 cm), the mother's height (cm) was also considered besides the variables migration background, premature delivery (yes/no), gestational diabetes (GDM) (yes/no), weight gain (kg) and weight at first visit (kg). The last three were analysed as continuous variables.

The odds of an episiotomy in the two study populations were also determined with a logistical regression model. The variables age, parity (nullipara vs. multipara), height (≤ 160/> 160 cm), pregnancy week at delivery (< 37/0 weeks/≥ 37 weeks), mode of delivery, maternal BMI and baby's head circumference (≤ 35 cm/ >35 cm) were considered. To calculate the odds of a grade 3 or

4 perineal tear, the logistical regression included the variables episiotomy (yes/no), age, parity and maternal height.

As well as the migration background, the logistical model with the outcome "transfer to a children's hospital (yes/no)" included the confounders age (four age groups), mode of delivery (vaginal, vacuum extraction, primary c-section, secondary c-section), premature labour (yes/no), presentation (cephalic yes/no), 5-min Apgar scores (0–7, 8–10) and umbilical cord pH values (≤ 7.10 vs. > 7.10).

Data analysis was performed with SAS 9.3. There were neither collinearities nor effect modifications. The significance level was set at p = 0.05.

Results

Age and parity

3159 women were recorded. Datasets from 3002 women, including 999 women with a Vietnamese migration background, were included. Under women with a Vietnamese migration background 45 were excluded because of twin pregnancy (n = 19), termination of pregnancy (n = 23) and incomplete documentation (n = 12). The average age of the women in the entire group was 30.4 years (women with a Vietnamese migration background: 29.2 years; non-migrants 31.0 years). 40.1 % of the women with migration background were primipara at the time of the present delivery, and 59 % of the non-migrant women. This and other significant differences were noted and adjusted as part of the regression analyses.

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► **Table 1** Indications for c-section (multiple answers possible), women with a Vietnamese and without a migration background, Berlin 2010–2015.

Operation indication	Non-migrants	Women with a Vietnamese migration background	All women
Primary c-section n = 303			
▪ Previous c-section/other uterus operations	58 (30.5%)	39 (48.8%)	107 (35.3%)
▪ Breech presentation	38 (17.0%)	12 (15.0%)	50 (16.5%)
▪ Other	39 (17.5%)	8 (10.0%)	47 (15.5%)
▪ Maternal disease	25 (11.2%)	4 (5.0%)	29 (9.6%)
▪ Cephalo-pelvic disproportion	16 (7.2%)	11 (13.8%)	27 (8.9%)
▪ Pathological CTG	20 (9.0%)	4 (5.0%)	24 (7.9%)
▪ Premature delivery	18 (8.1%)	3 (3.8%)	21 (6.9%)
▪ Placental insufficiency (suspected)	15 (6.7%)	3 (3.8%)	18 (5.9%)
▪ Pre-eclampsia/eclampsia	12 (5.4%)	3 (3.8%)	15 (5.0%)
Secondary c-section n = 455			
▪ Pathological CTG	111 (33.7%)	31 (24.6%)	142 (31.2%)
▪ Protracted birth/arrested labour in the first stage	74 (22.5%)	27 (21.4%)	101 (22.2%)
▪ Cephalo-pelvic disproportion	46 (14.0%)	34 (27.0%)	80 (17.6%)
▪ Protracted birth/arrested labour in the second stage	53 (16.1%)	20 (15.9%)	73 (16.0%)
▪ Premature rupture of the membranes	52 (15.8%)	12 (8.5%)	64 (14.1%)
▪ Previous c-section/other uterus operations	32 (9.7%)	25 (19.8%)	57 (12.5%)
▪ Breech presentation	34 (10.3%)	13 (10.3%)	47 (10.3%)
▪ Premature delivery	33 (10.0%)	4 (3.2%)	37 (8.1%)
▪ Green amniotic fluid	21 (6.4%)	8 (6.4%)	29 (6.4%)

Main question

Rate of primary and secondary c-section

► **Fig. 1** shows the distribution of vaginal and operative deliveries in the two study populations: women with a Vietnamese migration background had fewer caesarean deliveries overall, with 8.0% primary and 12.6% secondary c-sections than non-migrants (primary c-section: 11.1%; secondary c-section: 16.4%). Regression analysis (after adjustment) shows statistically non-significantly lower odds for primary (OR 0.75; CI 0.56–1.02; p = 0.0884) and secondary c-section (OR 0.82; CI 0.64–1.04; p = 0.1137) for the women with a migration background. Women with a relatively lower number (0 to 9) of antenatal visits (OR 2.02; CI 1.53–2.61. p = 0.0164) and/or age over 35 years (OR 1.87; CI 1.24–2.83; p = 0.0034) had significantly higher odds for primary c-section.

Secondary questions

1. Indications for operative delivery:

► **Table 1** lists the most frequent indications for primary and secondary c-section in the two study populations.

The indication for primary c-section was "previous c-section/other uterus operations" in 48.8% of the migrant group and in 30.5% of the non-migrant group. "Cephalo-pelvic disproportion" was a more frequent indication for both primary and secondary c-section in the women with a Vietnamese migration background than in the non-migrant group. In the case of breech presentation, the women with a Vietnamese migration background had a vaginal delivery much more often than the women in the comparative group. Non-migrant women had a primary c-section significantly more often for non-vertex presentation.

2. Weight change during pregnancy and gestational diabetes (GDM)

In the group of patients with a migration background, the average weight gain in the course of pregnancy was 12.0 vs. 13.9 kg in the comparative group. When height was included, an increase of 4.9 BMI units (median) in the course of pregnancy was recorded in both groups of patients. The influence of migration on the weight change during pregnancy was investigated by linear regression analysis: no significant association with the BMI change was found (p = 0.55). In the group with a Vietnamese migration background GDM was diagnosed in 9.1% of the women, a significantly higher percentage than in the comparative group of non-migrant women, in whom the rate was 6.7% (p = 0.018).

3. Birth weight

The mean infant birth weight was 3212 g in the group with a Vietnamese migration background and 3271 g in the comparative

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▶ **Table 2** Odds (odds ratio) of high infant birth weight depending on the mother's migration status, women with a Vietnamese and without a migration background, Berlin 2010–2015.

		n	OR	95 % confidence interval	p
Non-migrants		1950	1.00		
Vietnamese migration background		955	1.54	1.21–1.95	0.0004
Gestational diabetes	no	2686	1.00		
	yes	219	1.00	0.74–1.34	0.9844
Mother's height (cm)		2905	1.03	1.01–1.04	0.0002
Mother's weight gain (kg)		2905	1.09	1.07–1.11	< 0.0001
Weight at first antenatal visit (kg)		2905	1.03	1.02–1.04	< 0.0001
Premature delivery	no	2632	1.00		
	yes	273	0.09	0.06–0.14	< 0.0001

Logistical regression analysis; total n = 2905. Events 1473; reference classes: ≤ 3100 g: low weight class/>3310 g: high weight class; OR = odds ratio; Premature delivery: no: ≥ 37/0 weeks; yes: < 37/0 weeks

▶ **Table 3** Odds (odds ratio) of episiotomy (n = 324 cases), women with a Vietnamese and without a migration background, Berlin 2010–2015; logistical regression.

	OR	95 % CI	p
Non-migrants	1.00		
Women with a Vietnamese migration background	2.22	1.54–3.20	< 0.0001
Age < 25 years	1.00		
Age < 30 years	1.16	0.82–1.65	0.3960
Age < 35 years	1.02	0.70–1.47	0.9317
Age ≥ 35 years	0.78	0.51–1.19	0.2486
Nullipara	1.00		
Multipara	0.26	0.19–0.34	< 0.0001
Height ≤ 160 cm	1.00		
Height > 160 cm	1.37	0.97–1.95	0.0731
Time of delivery			
< 37 weeks	1.00		
≥ 37 weeks	1.48	0.89–2.47	0.1326
Vaginal delivery/primary and secondary c-section	1.00		
Operative vaginal delivery	4.59	3.11–6.77	< 0.0001
BMI < 25	1.00		
BMI < 30	0.97	0.73–1.28	0.8135
BMI ≥ 30	0.68	0.46–1.00	0.0468
Baby's head circumference ≤ 35 cm	1.00		
Baby's head circumference > 35 cm	1.17	0.89–1.52	0.2582

BMI = body mass index; CI = confidence interval; OR = odds ratio

group. To assess the influence of migration on birth weight using the logistical regression model, this was dichotomised. Birth weight below the median of 3310 g was defined as low and weight above this was defined as high birth weight. In the logistical regression model, the greater odds of birth weight over 3310 g in the newborns of women with a Vietnamese migration background are statistically significant (p = 0.0004) (▶ **Table 2**).

4. Episiotomy rate and frequency of grade 3–4 perineal tears

The episiotomy rate was 14 % in the group of women with a Vietnamese migration background and 9.6 % in the comparative population. Logistical regression analysis showed significantly increased odds (p < 0.0001) for an episiotomy in mothers with a Vietnamese migration background having an operative vaginal

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▶ Table 4 Odds (odds ratio) of a perineal tear (grade 3 and 4)*, women with a Vietnamese and without a migration background, Berlin 2010–2015; logistical regression.

	OR	95% CI	p
Episiotomy no	1.00		
Episiotomy yes	2.66	1.05–6.73	0.0390
Non-migrants	1.00		
Women with a Vietnamese migration background*	2.93	0.93–9.24	0.0661
Age < 25 years	1.00		
Age < 30 years	1.09	0.31–3.77	0.8959
Age < 35 years	1.14	0.31–4.27	0.8440
Age ≥ 35 years	2.09	0.56–7.76	0.2721
Nullipara	1.00		
Multipara	0.48	0.19–1.22	0.1234
Height ≤ 160 cm	1.00		
Height > 160 cm	1.12	0.37–3.40	0.8430

* events = 24

▶ Table 5 Odds (odds ratio) of transfer of the newborn to the children's hospital according to migration status, women with a Vietnamese and without a migration background, Berlin 2010–2015; logistical regression.

	n	OR	95% confidence interval	p
Non-migrants	1857	1.00		
Women with a Vietnamese migration background	930	0.86	0.56–1.34	0.5108
Age < 25 years	442	1.00		
Age < 30 years	805	0.64	0.35–1.18	0.1544
Age < 35 years	902	0.91	0.52–1.63	0.7715
Age ≥ 35 years	638	1.11	0.61–2.02	0.7296
Delivery mode vaginal	1974	1.00		
Delivery mode vacuum/forceps	130	1.50	0.67–3.37	0.3285
Delivery mode primary c-section	269	1.72	0.93–3.16	0.0825
Delivery mode secondary c-section	414	1.31	0.77–2.21	0.3231

n = 2787, events = 198, OR = odds ratio

delivery. The odds were significantly lower in multiparas (p < 0.0001) (▶ **Table 3**).

Severe perineal tears occurred in 1.3 % of the women with a Vietnamese migration background and in 0.6 % in the comparative group. In the regression model, increased odds were seen for a grade 3–4 perineal tear if an episiotomy was performed (p = 0.039), and the variable migration background did not have a significant influence (p = 0.066) (▶ **Table 4**).

5. 5-min Apgar scores and umbilical cord arterial pH values

106 newborns had 5-min Apgar scores ≤ 7. This is equivalent to 3.5 % of the babies of women with a migration background and 3.7 % of the babies in the non-migrant group. A pH value ≤ 7.10 was recorded in 81 babies. The non-migrant group had a higher

percentage of borderline cord pH values (umbilical cord arterial pH value ≥ 7.00 to ≤ 7.10) at 2.6 vs. 1.7 % in the women with a migration background. The results of the logistical regression analysis show that babies of women with a Vietnamese migration background do not have higher odds of a 5-min Apgar score ≤ 7 (p = 0.6805) or umbilical cord arterial pH value ≤ 7.10 (p = 0.1854).

6. Postnatal transfer to the children's hospital

The logistical regression model did not show a significant difference in the odds for the newborn of women with a Vietnamese migration background to be transferred to the children's hospital (p = 0.5108) (▶ **Table 5**).

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Discussion

This study is the first major analysis of pregnancy and perinatal data in Germany that focuses on women with a Vietnamese migration background. Like other groups of Asian immigrants, this group is receiving greater attention in studies from other western industrialised countries, as it is suspected that constitutional and ethnic cultural differences as well as behavioural, lifestyle and migration factors have particularly marked effects on obstetric outcomes [1, 2, 27, 45].

Main question

C-section rate

The hypothesis of an increased c-section rate in women with a Vietnamese migration background was not confirmed; we found an overall lower c-section rate for these migrant women, confirming the results of studies from the US, Norway and Taiwan [20]. In a review study of migrant women from Southeast Asia (Vietnam, Thailand, Cambodia, Laos), Merry et al. (2013) found a lower c-section rate than among the "native" women, which applied for both primiparous and multiparous women. The research group explains this by a preference for vaginal birth by Asian migrants which brought with them from their countries of origin and by a "healthy migrant" effect (i.e., migrants are healthier on average than the local population; persons with significant health problems do not migrate), a healthier lifestyle (low BMI; no drug consumption, no nicotine or alcohol abuse in pregnancy) and particular social and familial support, but see a need for further research [20].

Secondary questions

Indications for c-section

The (suspected) diagnosis of cephalo-pelvic disproportion as an indication for c-section was markedly more frequent in the Vietnamese migrant group than in the non-migrants. This is possibly an effect of biological and constitutional conditions (height and pelvic size) in the Vietnamese migrants [2]. In their large American cohort study, Wong et al. (2008) describe how "cephalo-pelvic disproportion" as an indication for c-section was represented most in the group of Southeast Asian immigrants [46].

Weight and BMI changes

We found a higher rate of gestational diabetes (GDM) among the women with Vietnamese migration background. Gestational diabetes is usually associated with increased weight gain. However, we did not find that the variable "Vietnamese migration background" had a significant influence on weight and BMI change during pregnancy, neither in the descriptive statistics nor in the linear regression analysis. Cripe et al. (2011) and Cheng et al. (2015) similarly describe a higher prevalence of GDM among Vietnamese pregnant women without a significant difference in maternal weight gain [2, 23]. The increased rate of GDM in Vietnamese mothers is also confirmed in other studies [18]. Cripe et al. (2011) explain the increased GDM rate with genetic, lifestyle/behavioural and cultural (different religious and dietary traditions) as well as environmental and migration factors [2].

Baby's birth weight

Our study results show that women with a Vietnamese migration background have higher odds of delivering a baby with a birth weight over 3310 g than women in the comparative group. Wong et al. (2008) describe a higher rate of Vietnamese newborns with a birth weight < 2500 g in the patients they studied [16]. Fu et al. (2010) compared obstetric data of local Taiwan Chinese women with those of Vietnamese immigrant mothers [46]. No influence of the Vietnamese migration background on the birth weight of the newborns was found. The study results are very heterogeneous overall. Both the comparative populations and the classification or definition of under- and overweight differ depending on the study. This makes comparison difficult.

Frequency of episiotomy and grade 3–4 perineal tears

In our study, a Vietnamese migration background was associated with higher odds for episiotomy but not for a higher grade perineal tear. In a population-based retrospective analysis of deliveries in the years 2000 to 2008 in Australia (n = ca. 692 000 women, including ca. 14 000 Vietnamese women) Dahlen et al. (2013) found the highest episiotomy rate in Vietnamese primiparas and multiparas [18]. It is conceivable that midwives and doctors fear more severe perineal tears in women with a Vietnamese migration background with a supposedly or actually small pelvis and therefore narrow birth canal, so a (prophylactic) episiotomy is performed more often. Wheeler et al. (2012) in a literature review and Brown et al. (2018) in a recent analysis of 10 750 singleton births in Australia found that an Asian origin is an independent risk factor for severe perineal injuries for migrant women in Western countries [27, 47], which was not confirmed in our study in a Berlin hospital for the women with a Vietnamese migration background.

5-min Apgar score and umbilical cord arterial pH value

In view of the average lower height and greater odds of higher birth weight, there could be a risk of cephalo-pelvic disproportion. When birth management is of high quality, there should nevertheless be no differences between the comparative groups in child outcomes. The results in the newborns of women with Vietnamese migration background did not differ in our study from those of the comparative group without a migration background. In agreement with our results, no differences in the 5-min Apgar score were found in Vietnamese migrants in Australia and in the US compared with local women [2, 18].

Transfer to children's hospital

The third child outcome parameter that we chose, rate of transfer to the children's hospital, did not differ between the two patient groups in our study. Other working groups in Germany and Italy did not find any differences in the rates of transfer between newborns of migrants from different countries of origin and non-migrants [47 – 49].

Limitations of the study

The study in single-centre and the data were collected retrospectively. Since precise details about the migration background of the women have not been recorded to date as part of the perinatal

data, the (retrospective) name analysis method was used, though this is quite usual in migration research [29 – 44]. Classification to the first or second migrant generation is therefore not possible. The possible influence of duration of residence or increasing acculturation cannot be deduced from the available data. A further limitation is that the comparative group could contain a very small percentage of women with a non-Vietnamese migration background.

Conclusions

1. Advantages are shown for women with a Vietnamese migration background in the frequency of primary and secondary c-sections and differences in the indications for these compared with women without a migration background.
2. Major differences in perinatal outcomes are not found, so good quality of care of women with a Vietnamese migration background in pregnancy and during delivery can be deduced.
3. The significance of acculturation factors remains unclear. For future studies of the perinatal outcome of women with a migration background from different regions of origin vs. non-migrants, the migration status, duration of residence and migration generation should be recorded routinely, and/or multi-centre prospective studies should be conducted.

Conflict of Interest

The authors declare that they have no conflict of interest.

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