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Effect of maternal origin on the association between maternal height and risk of preterm birth in Belgium: a retrospective observational cohort study

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ABSTRACT

Objectives To investigate the effect of maternal origin on the association between maternal height and the risk of preterm birth (PTB).

Design Retrospective observational cohort study.

Setting Two of the three Belgian regions, including Brussels-Capital and Walloon regions.

Participants A total of 245 204 women spontaneously delivered live singletons between 2009 and 2013. Maternal nationality at the time of birth included Belgium, Congo, French, Italy, Morocco, Poland, Romania and Turkey.

Outcomes measures The outcome variable was spontaneous PTB, defined as childbirth occurring at less than 37 weeks' gestation.

Results Average height, demographic characteristics and the spontaneous PTB rate differed according to maternal origin, defined as maternal nationality at birth. The pattern of association between maternal height and the risk of PTB was not uniform by maternal nationality at birth. The low maternal height category was associated with a statistically significant increased risk of spontaneous PTB for Belgian (adjusted OR (aOR) 1.23, 95% CI 1.16 to 1.32), Italian (aOR 1.48, 95% CI 1.12 to 1.96) and Polish (aOR 1.76, 95% CI 1.11 to 2.78), respectively. However, this association was not observed for the women from Congo, France, Morocco, Romania and Turkey.

Conclusions The association between height and the risk of PTB was modified by maternal nationality, even for mothers from the same region of the world. For example, there was a significant inverse association for the Belgians and Italians but not for French women. Our data suggest that PTB risk assessment should take into account the specific height of maternal origin.

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Strengths and limitations of this study

► This is a retrospective observational cohort study, including a large number of migrant mothers in Belgium, which allowed us to construct eight nationality groups comprising a sufficient number of individuals to perform stratification by maternal nationality at birth.

► This is the first study to analyse the association between maternal height and preterm birth by examining the homogeny of maternal origin.

► No detailed information regarding obstetrical history, maternal smoking, nutritional status or biological and genetic markers was available.

mother or the fetus, genetic influences, environmental exposure, infertility treatments, behavioural and socioeconomic factors, and iatrogenic PTB.[3]

The association between maternal height and the risk of PTB has been investigated.[4–10] Some studies showed an inverse association between maternal height and PTB,[4 10] but some studies did not find any significant association.[5–9] A recent study demonstrated that the association between height and the risk of PTB varied across various ethnic groups in USA.[11]

Belgium has long been a country of immigrants and has become a country with one of the largest foreign-born populations; 44.9% of deliveries in Belgium in 2013 were to foreigners living in the country (ie, women not of Belgian nationality when giving birth).[12] These foreign women were mainly economic migrants (Italian) in the early 20th century or people affected by family reunification (Morocco). They also include civil servants from European institutions or international institutions in high-income countries, as well as asylum seekers and undocumented workers from low-income and middle-income countries.

INTRODUCTION

Preterm birth (PTB), defined as childbirth occurring at less than 37 completed weeks, remains the leading cause of perinatal morbidity and mortality.[1 2] An estimated 14.9 million preterm infants were born in 2010, accounting for 11.1% of all live births worldwide, ranging from approximately 5% in European countries to 18% in African countries.[2] The main causal factors linked to PTB include medical conditions in the

The Centre for Perinatal Epidemiology (CEpiP) in Belgium collects mandatory perinatal official data from Wallonia and Brussels and covers all the deliveries in the two regions regardless of citizenship. Information regarding maternal nationality both at birth and at delivery is available for each woman in CEpiP's database.

The aim of this study is to investigate the association between maternal height and the risk of PTB stratified by maternal nationality at birth. We use the nationality of each mother at birth without any categorisation, which allows us to construct highly homogeneous groups within the study population.

METHODS
Study design
This was a retrospective cohort study, using the population-based data linking birth registry and hospital medical data.

Setting
The setting for the study was two of the three regions in Belgium, including Brussels-Capital and Walloon regions. Brussels is located in the centre of the country, and Wallonia is the Southern part of Belgium. The total annual number of births in the two regions is approximately 62 000 and covers 47 maternity units, and the majority of deliveries (99.6%) take place in maternity units.[12]

Data sources
The study population consisted of all single live births from 2009 to 2013 in the database of the CEpiP in Belgium. The database linked the routing data of birth registry and hospital medical data. The birth registry legally includes certificates of all live births or stillbirths from 500 g or 22 weeks' gestation regardless of maternal citizenship, including asylum seekers, undocumented persons, planned and unplanned home births. The socioeconomic data were completed by the civil registration service or by parents when declaring the birth/death within 15 days of delivery. The hospital medical data are collected and completed by care providers in each maternity unit. The details of this linkage, data management and verification have been described previously.[13] Briefly, CEpiP-linked routing data contained information regarding maternal demographics, including maternal origin, maternal risk factors, medically assisted procedures, delivery method and perinatal outcomes. Linked data are available for 299 840 live births and 2132 stillbirths during 2009–2013.

Two variables related to the maternal origin were available in CEpiP's database: one is the nationality of the mother at her birth (named 'maternal nationality at birth'), and the other is her nationality at delivery (named 'maternal nationality at delivery').

Participants
Participants included single live births from 2009 to 2013 in CEpiP's-linked database who met the inclusion criteria.

The inclusion criteria were as follows: singleton live births, spontaneous delivery, born at 22–42 weeks of gestation and women who had nationality at birth from the eight most represented nationalities in the database, including Belgium, Congo, France, Italy, Morocco, Poland, Romania and Turkey.

The reason for including only the eight most represented nationalities is based on the estimation of the sample size in logistic regression analysis to achieve predictive stability.[14] Assuming an average PTB rate of 5% in each model of the eight nationalities, and eight predictor variables contained in the model, at least 10 events per variable, a total of 80 events (PTB) or at least 1600 subjects (80/5%) were required in each model, with 80% power and a two-sided significance level of 5%. Among the eight nationalities meeting the sample size estimation and included in the analysis, the largest categories were Belgian (n=69 705), Moroccan (n=14 046), French (n=5020), Italian (n=3922), Turkish (n=3259), Congolese (n=2924), Romanians (n=2904) and Polish (n=1924).

Exclusion criteria were as follows: induction of labour or elective caesarean (defined as a section planned before the onset of labour), gestational weeks at delivery <22 or >42, birth weight <500 g, maternal age <18 years, unknown level of education and missing body mass index (BMI).

Variables
The prepregnancy weight and maternal height were registered at the first prenatal consultation at <12 weeks or based on self-reports if the first consultation was held >12 weeks. In this paper, the maternal nationality is defined as the maternal nationality at birth.

To obtain an overview of the distribution of maternal height among maternal nationalities, we calculated the 25th, 50th and 75th percentile values of maternal height based on the entire obstetric population (all deliveries). Furthermore, in order to compare among the included population, maternal height was classified into three categories based on height distribution, namely, <25th (short), 25th–75th (middle) and >75th (tall), specific for each maternal nationality, with the middle category serving as reference.

Potential confounding factors for PTB based on previous study and availability on CEpiP's database included the following: maternal age (<25, 25–34 and ≥35 years), maternal education based on the highest level achieved (secondary or less, postsecondary or higher), employment status (yes, no), parity (primipara, multipara), maternal BMI (<18.5 kg/m², 18.5–24.9 kg/m², ≥25.0 kg/m²), gestational or permanent hypertension (yes, no), gestational or permanent diabetes (yes, no), medically assisted conception (yes, no).
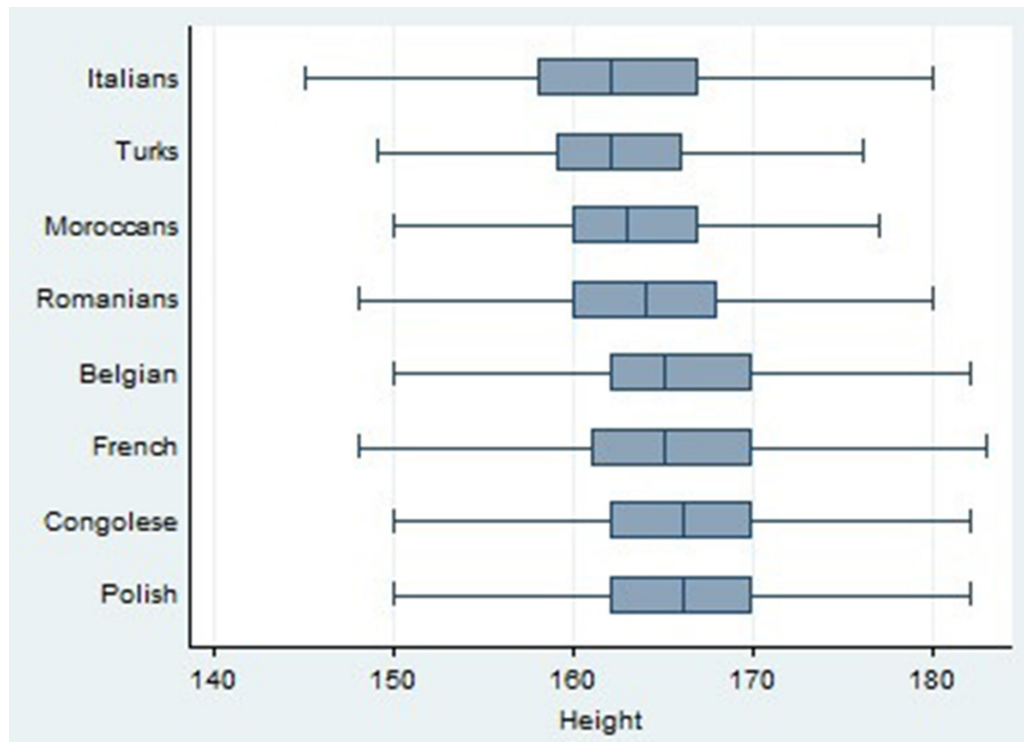
Figure 1 Box plot of maternal height for the overall obstetric population in eight groups according to maternal nationality at birth. The bottom (left) and top (right) of the box represent 25th and 75th percentiles, the band in the middle represents the median (50th percentile). The lower whisker represents the minimum value of the data while the upper whisker represents the maximum value of the data (analysis of variance, p<0.001).

Main outcome and measurement

The outcome variable was spontaneous PTB, defined as childbirth occurring at less than 37 completed weeks. The spontaneous birth includes all deliveries after a spontaneous labour.

Statistical methods

Baseline characteristics of the study population were summarised with counts (percentages) for all categorical variables. Continuous variables were tested with one-way analysis of variance (ANOVA). Categorical variables were compared with the X^2 test. Occurrence of spontaneous PTB at <37 weeks and its 95% CI was estimated for each maternal nationality. To determine the relationships between maternal height and risk of spontaneous PTB, crude OR and 95% CI were calculated across the maternal nationalities. Logistic regression models were used for controlling eight confounding variables such as maternal age, maternal education, employment status, parity, maternal BMI, hypertension, diabetes and medically assisted conception. Models were stratified by maternal nationality.

All tests were two tailed and used significance level set at 0.05. All analyses were performed using Stata V.14.0 software.

Ethics approval

Individual information was not available.

RESULTS

A total of 245 204 women delivered in two regions from 2009 to 2013 and belong to eight groups according to maternal nationality. Missing data on maternal height were 10.1% for all deliveries (n=24 763). The 25th, 50th and 75th percentile values of maternal height of entire obstetric population (all deliveries) who had available data on maternal height were calculated (n=220 441) (figure 1). Calculation based on the overall obstetric population allowed us to obtain an overview of the distribution of maternal height according to maternal origin and to avoid selection bias by excluding non-spontaneous labour for obstetric indications. The average (SD) height from lowest to the highest was 162 cm (5.7) for Turks (n=6601), 162 cm (6.3) for Italians (n=9079), 163 cm (5.9) for Moroccans (n=28 021), 163 cm (6.5) for Romanians (n=4195), 165 cm (6.3) for French (n=9879), 165 cm (6.4) for Belgians (n=152 414), 166 cm (5.9) for Polish (n=3732) and 166 cm (6.5) for Congolese (n=6520). Through one-way ANOVA, we found that the difference of mean height between the eight groups was statistically significant (p<0.001).

For the eight groups of maternal nationality most represented in CEpiP's database, there were 220 441 pregnancies with height information; 215 767 singleton live births were identified and linked, and 89 580 subjects were excluded due to induction of labour or elective caesarean (41.5% of singleton live births). Births were also excluded

if the gestational weeks at delivery were <22 or >42 or unknown (n=52), birth weight <500 g (n=12), maternal age <18 years (n=1005), unknown level of education (n=19 002) and missing BMI (n=3240). Therefore, a total of 102 876 births across eight nationalities were included in the following univariate and logistic regression analyses.

The characteristics of mothers differed according to maternal nationality for all variables in table 1 (p<0.001). Concerning the socioeconomic characteristics, mothers from Belgium, French and Italy were more educated and more employed than women from Poland, Romania, Congo, Morocco and Turkey. Regarding medical characteristics, mothers from three non-European countries (Congo, Morocco and Turkey) were more frequently multiparous and more overweight. In contrast, these women had less usage of medically assisted treatment. The highest proportion of diabetic women was found in Moroccan women (8.3%), and the lowest proportion of diabetic women was found in Romanian women (4.1%). For the frequency of hypertension, the highest was observed for women from Congo (6.4%) and lowest for women from Morocco (1.7%) and Romania (1.8%).

Figure 2 shows that the PTB rate varied among the various maternal nationalities. Rates were highest for women from Italy (7.7%) and Belgium (7.6%) and lowest for Moroccan women (4.5%). There were similar trends between PTB rate and the maternal height categories: the lower the maternal height, the higher the PTB rate, except for Congolese, Romanian and Polish women, where the PTB rate in the tall group were slightly higher than that of the middle group (table 2).

The effects of maternal nationality at birth on the association between height and the risk of PTB are displayed in table 3. Compared with the middle height category, the low height category was associated with a statistically significant increased risk of spontaneous PTB, with an adjusted OR (aOR) of 1.23 (95% CI 1.16 to 1.32) for Belgians, 1.48 (95% CI 1.12 to 1.96) for Italians and 1.76 (95% CI 1.11 to 2.78) for Polish. This relationship was not statistically significant for the remaining five nationality groups, although a similar inverse association was observed with or without adjustment for maternal age, education level, employment status, parity, maternal BMI, hypertension, diabetes and medically assisted conception.

The direction and strength of the associations between higher height categories and the risk of PTB was less pronounced (table 3). After adjustment, the higher height category was significantly associated with a decreased risk of spontaneous PTB only for Belgians, with an aOR of 0.82 (95% CI 0.76 to 0.89).

DISCUSSION
Main findings
This study examined the association between maternal height and the risk of spontaneous PTB according to maternal origin, defined as the maternal nationality at birth without any categorisation of nationality according to region. Various maternal origins had various height distributions and various spontaneous PTB rates. Maternal origin influenced the association between height and the risk of PTB. These differences also existed for the women from same world regions or same income group. Belgian, Italian and French women have been grouped into same subgroup in previous studies of the effect of maternal origin on birth outcome.

Maternal short stature as a risk factor for PTB has been investigated previously with mixed results. A significant association has been found in a large study reported by Smith et al,[5] in a study that examined teenage pregnancies[7] and in a study done by Kramer et al. Some studies did not demonstrate that maternal height predicted the risk of PTB, such as in Germany,[15] Great Britain,[8] Sudan[4] and among a homogeneous Chinese population.[16] A significant association was found in a univariable model or unadjusted data but not for multivariable model or adjusted data.[6 9 10] These mixed results could be partly due to varying definitions of short stature or height cut-offs, variation in quality of studies, heterogeneous populations and small sample sizes in the subgroups.[11 17]

Effect of maternal origin on the association
Our findings are consistent with those of a recent study conducted in California, which showed that patterns of association between height and risk of spontaneous PTB varied according to the maternal ethnicity.[11] In the present study, an inverse significant association between height and risk of PTB was found for Belgians, Italians and Polish. However, this association was not observed for women from Congo, France, Morocco, Romania or Turkey. Our findings are in line with studies supporting maternal origin as a modifier in a similar manner. For example, a study from Canada reported that the association between area characteristics and birth outcomes was modified by maternal birthplace: area poverty was associated with PTB among Canadian-born women but not among foreign-born mothers.[18] Another study from the USA reported that cumulative exposure to income inequality was associated with PTB for Hispanic mothers but not for black or white mothers.[19] The causes of birth outcome disparities by maternal origin are complex and unclear. During recent decades, disparities in adverse birth outcomes have been documented across subgroups of maternal origin, including ethnicity, maternal place of birth, maternal nationality at birth and migrant status.

Some studies reported worse birth outcomes for foreign-born women compared with native women, with more obstetrical interventions, perinatal mortality,[20] low birth weight,[21] PTB[22] and increased caesarean section.[23] Some studies showed mixed results.[24 25] These inconsistent results could be partly explained by grouping women with different origins, cultures and maternal characteristics into the same subgroups according to ethnicity classification, geographical regions or income groups.[24]

Table 1 The characteristics of the population included in the study according to maternal nationality at birth

	Belgium N=69 705	Congo N=2904	French N=5020	Italy N=3922	Morocco N=14 046	Poland N=1924	Romania N=2904	Turkey N=3259	P values†
Maternal age, year, n (%), n=102 876									
<25	11 981 (17.2)	498 (17.2)	530 (10.6)	391 (10.0)	2547 (18.1)	197 (10.2)	646 (30.8)	819 (25.1)	
25–34	47 323 (67.9)	1773 (61.0)	3338 (66.5)	2569 (65.5)	8572 (61.0)	1340 (69.7)	1205 (57.5)	2019 (62.0)	
≥35	10 401 (14.9)	633 (21.8)	1152 (22.9)	962 (24.5)	2927 (20.8)	387 (20.1)	245 (11.7)	421 (12.9)	
P values†	Reference	***	***	***	***	***	***	***	***
Education level, n (%), n=102 876									
Secondary or less	34 196 (49.1)	2126 (73.2)	1967 (39.2)	2160 (55.1)	11 842 (84.3)	1249 (64.9)	1613 (77.0)	2805 (86.1)	
Postsecondary or higher	35 509 (50.9)	778 (26.8)	3053 (60.8)	1762 (44.9)	2204 (15.7)	675 (35.1)	483 (23.0)	454 (13.9)	
P values†	Reference	***	***	***	***	***	***	***	***
Employment status, n (%), n=102 110									
Yes	51 195 (74.0)	977 (34.0)	3578 (71.9)	2748 (70.4)	3837 (27.5)	1316 (68.8)	853 (41.0)	1044 (32.2)	
No	17 965 (26.0)	1897 (66.0)	1400 (28.1)	1155 (29.6)	10 124 (72.5)	597 (31.2)	1228 (59.0)	2196 (67.8)	
P values†	Reference	***	***	***	***	***	***	***	***
Parity, n (%), n=102 694									
1 (primipara)	33 319 (47.9)	865 (29.9)	2410 (48.1)	1967 (50.2)	4757 (33.9)	956 (49.7)	977 (46.6)	1138 (35.0)	
≥2 (multipara)	36 238 (52.1)	2032 (70.1)	2603 (51.9)	1950 (49.8)	9278 (66.1)	968 (50.3)	1119 (53.4)	2117 (65.0)	
P values†	Reference	***	0.813	0.005	***	0.122	0.244	***	***
BMI, n (%), n=102 876									
<18.5kg/m²	5442 (7.8)	87 (3.0)	403 (8.0)	250 (6.4)	484 (3.5)	126 (6.6)	166 (7.9)	134 (4.1)	
18.5–24.9kg/m²	44 677 (64.1)	1453 (50.0)	3462 (69.0)	2498 (63.7)	7544 (53.7)	1426 (74.1)	1412 (67.4)	1931 (59.3)	
≥25.0kg/m²	19 586 (28.1)	1364 (47.0)	1155 (23.0)	1174 (29.9)	6018 (42.8)	372 (19.3)	518 (24.7)	1194 (36.6)	
P values†	Reference	***	***	***	***	***	0.003	***	***
Medically assisted conception, n (%), n=99 384									
No	64 908 (96.0)	2671 (97.6)	4540 (95.9)	3598 (95.0)	13 263 (97.9)	1729 (96.8)	1980 (98.3)	3094 (97.5)	
Yes	2689 (4.0)	67 (2.4)	196 (4.1)	191 (5.0)	284 (2.1)	58 (3.3)	35 (1.7)	81 (2.5)	
P values‡	Reference	***	0.585	***	***	0.117	***	***	***
Diabetes, n (%), n=99 384									
No	66 052 (95.3)	2715 (94.7)	4798 (96.2)	3648 (93.5)	12 734 (91.7)	1781 (94.7)	1953 (95.9)	3036 (93.8)	
Yes	3295 (4.8)	153 (5.3)	192 (3.9)	254 (6.5)	1153 (8.3)	99 (5.3)	84 (4.1)	202 (6.2)	
P values†	Reference	0.151	0.004	***	***	0.301	0.188	***	***
Hypertension, n (%), n=102 648									
No	67 303 (96.8)	2714 (93.7)	4900 (97.8)	3810 (97.4)	13 774 (98.3)	1868 (97.2)	2048 (98.2)	3184 (98.0)	
Yes	2251 (3.2)	184 (6.4)	108 (2.2)	103 (2.6)	244 (1.7)	53 (2.8)	38 (1.8)	66 (2.0)	
P values†	Reference	***	***	0.037	***	0.243	***	***	***

***P<0.0001.
†χ^2 test comparing eight groups of maternal nationality.
‡χ^2 test comparing women who had Belgian nationality at birth.
BMI, body mass index.
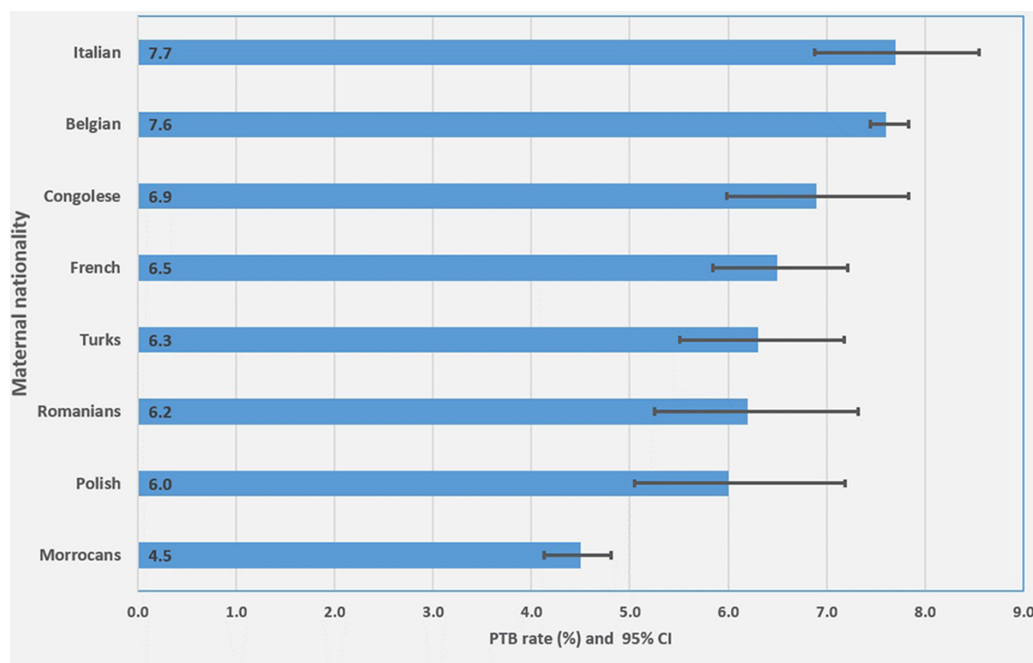
Figure 2 Preterm birth (PTB) rate and 95% CI for eight selected groups of maternal nationality at birth.

For many maternal characteristics, the present data showed a significantly different pattern among the selected eight groups of maternal nationality at birth. These variations persisted among the Belgian, French and Italian women who are categorised into the same subgroup of high income according to the definition of the World Bank Atlas Method (http://data.worldbank.org/), which is often used in Europe for classification of immigrant's country in the previous studies.[25] It may be more appropriate to analyse the association between the maternal height and the risk of PTB separately according to their own nationality group, in order to avoid the effect of heterogeneity within the subgroup.

We show herein that the variation in the rate of PTB differed according to maternal nationality, the lowest rate being for Moroccan women. This has also been reported in a previous study in the Netherlands that demonstrated a higher risk of PTB for Surinamese and Ghanaian

women compared with Dutch women but a lower risk for Turkish and Moroccan women.[26] A study in the USA reported that Arab-Americans had a lower risk for PTB than white Americans.[27]

Mechanisms between maternal stature, risk of PTB and role of maternal origin

A few possible mechanisms have been proposed to explain the relationship between maternal stature and risk of PTB. Genetic, transgenerational, early life and environmental factors may play a role in this relationship. Pelvic dimensions and shapes vary as well among ethnic groups.[28] A small pelvis was more prevalent in women with short stature.[29] If maternal short stature leads to shortened gestation by increasing the risk of idiopathic preterm labour, then short women had more risk of PTB.[30] Short maternal stature was associated with lower uterine volume and blood flow, increasing the risk for

Table 2 Spontaneous preterm birth (PTB) (<37 weeks) rate by maternal height categories in eight selected groups of maternal nationality at birth

Maternal nationality	Overall PTB				PTB by height categories		
	Rank	n	%		Short %	Middle %	Tall %
Italian (n=3922)	1	301	7.7		10.3	7.2	5.9
Belgian (n=69 705)	2	5321	7.6		9.4	7.4	6.0
Congolese (n=2904)	3	199	6.9		7.2	6.3	7.7
French (n=5020)	4	326	6.5		7.3	6.8	4.6
Turks (n=3259)	5	205	6.3		7.8	6.2	4.9
Romanians (n=2904)	6	130	6.2		7.0	5.8	5.9
Polish (n=1924)	7	116	6.0		8.6	4.9	5.7
Moroccans (n=14 040)	8	626	4.5		4.9	4.3	4.1

Table 3 Maternal height and risk for preterm birth <37 weeks according to the maternal nationality at birth

| Maternal nationality | Maternal height categories | | Middle | Tall | |
| | Small | | | | |
	Crude OR (95% CI)	aOR* (95% CI)	OR	Crude OR (95% CI)	aOR (95% CI)
Belgian (n=69 705)	1.30 (1.23 to 1.39)†	1.23 (1.16 to 1.32)†	1	0.81 (0.75 to 0.87)†	0.82 (0.76 to 0.89)†
Congolese (n=2904)	1.15 (0.81 to 1.61)	1.12 (0.77 to 1.63)	1	1.25 (0.87 to 1.79)	1.29 (0.87 to 1.91)
French (n=5020)	1.09 (0.84 to 1.41)	1.00 (0.72 to 1.27)	1	0.66 (0.48 to 0.93)†	0.75 (0.53 to 1.06)
Italian (n=3922)	1.47 (1.13 to 1.93)†	1.48 (1.12 to 1.96)†	1	0.81 (0.59 to 1.11)	0.90 (0.65 to 1.25)
Moroccans (n=14 040)	1.14 (0.95 to 1.37)	1.07 (0.89 to 1.30)	1	0.94 (0.76 to 1.17)	0.92 (0.73 to 1.14)
Polish (n=1924)	1.81 (1.19 to 2.75)†	1.76 (1.11 to 2.78)†	1	1.17 (0.70 to 1.96)	1.16 (0.67 to 2.02)
Romanians (n=2904)	1.23 (0.83 to 1.84)	1.10 (0.72 to 1.70)	1	1.02 (0.63 to 1.65)	0.98 (0.59 to 1.62)
Turks (n=3259)	1.29 (0.93 to 1.78)	1.35 (0.97 to 1.88)	1	0.78 (0.54 to 1.15)	0.77 (0.51 to 1.16)

*Adjusted for: maternal age, education level, employment status, parity, maternal BMI, hypertension, diabetes and medically assisted conception.
† P-value <0.001
aOR, adjusted OR; BMI, body mass index.

fetal grow restriction, cephalopelvic disproportion and caesarean section.[29] The effect of ethnicity on gestational length was also reported in a study in the UK.[31] Maternal short stature may be associated with a lack of nutrients. Undernourished girls often grow up to become women of below-average height and often give birth to smaller infants.[30] Shorter women having chronic malnutrition may be more likely to have infection during pregnancy, resulting a high risk of PTB.[32] Placental epigenetic modification contributes to intrauterine growth and to adulthood height determination.[33]

Limitations and strengths

Several limitations of the present study should be highlighted. First, certain maternal and fetal risk factors for PTB were not accounted for, including smoking, prior PTB, nutritional status, infection, acculturation, stress/depression, family support, uterine contractions, cervical length and biological/genetic markers. All these factors may confound or modify the relationship between height and PTB. Second, our findings should be interpreted with caution because of a high rate of missing or incomplete information regarding height (10%), educational level (18%) and BMI (3%), although the proportion of these missing data did not vary across the eight groups of maternal nationality. Third, the analysis was limited by the reporting and coding in the database which was linked from birth certificates and hospital discharge data. In particular, weight was self-reported if the first consultation was held >12 weeks. In addition, diabetes and hypertension were documented in different forms, either pre-existing or recognised during pregnancy, regardless of the diagnostic criteria used. Several techniques and definitions may have been used across the country, and we cannot exclude that this could affect our results.

The strength of our study is that it is population based, with a low rate of missing data and a large set of covariates. Another strength is the availability of a large number of migrant mothers in Belgium, which has allowed to construct eight nationality groups including enough individuals to perform stratification by maternal nationality at birth. This allowed us to overcome the heterogeneity of misclassification bias of subgroups due to a small number of subjects in each group. To our knowledge, this is the first study to analyse the association between maternal height and PTB according to maternal nationality at birth.

CONCLUSION

The association between height and the risk of PTB is modified by maternal nationality, even for mothers from the same region of the world. For example, there was a significant inverse association for Belgian and Italian, but not for French women. Our results suggest that PTB risk assessment should take into account both height and maternal origin.

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