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Abstract

This study examines the predictors of birth outcomes among women of European and African ancestry and considers the birthplace of the babies’ fathers (foreign born vs. native born) as a protective factor. This is a secondary data analysis of 146,431 singleton births among women of European and African ancestry, both native-born and foreign-born, in a 21 birth hospital region of Central New York State from 1996 to 2003. Foreign born fathers were found to have 15% fewer low birth weight infants than US-born fathers, after controlling for the race and birthplace of the mother, tobacco use and Medicaid. Although this secondary data analysis does not allow us to determine the social determinants of the better birth outcomes among infants of foreign born fathers, it does demonstrate that fathers matter and that foreign born fathers are associated with reduced low birth weight in their infants.

Keywords: Healthy migrant, Fathers, Low birth weight

Introduction

A number of studies have found that foreign-born women who give birth in the United States have better birth outcomes than women born in the United States, especially as measured by low birth weight (LBW) [1–4]. This finding, termed the ‘‘healthy migrant’’ or ‘‘epidemiological paradox’’, runs contrary to findings from other investigations that identify poverty and lack of social and economic resources as the primary risk factors for poor birth outcomes [5–7]. The infants of foreign born mothers appear to be protected from adverse health outcomes, despite experiencing social and economic disparities [8–11]. This foreign- born advantage is strongest among women of African and Hispanic ancestry. In 1998, according to a study by Acevedo-Garcia et al. over 11% of US born African American women gave birth to low birth weight babies, compared to less than 8% among foreign-born African women who migrated to the United States [12]. The migrant advantage persists even after statistical measures were used to control for maternal education, residential segregation, residential moves (movement away from the birth-state for the native-born cohort), and health behaviors of pregnant women [13–16]. The migrant advantage is also [end page 1350] seen in studies with fathers. Gibson-Davis and Brooks-Gunn reported that infants born to foreign-born fathers were more likely to be breast-fed than infants of Americanborn fathers [17]. The research on migrant advantage among men is limited and to our knowledge there are no studies that have considered the natality of the baby’s fathers on their infants’ birth weights.

The extant literature on child outcomes has focused primarily on mothers and limited attention has been paid to the role of fathers as influential agents in children’s development. Studies on fathers and fatherhood have generally centered on issues of father roles, availability, involvement, direct care and nurturance, and socialization behaviors and few investigations have considered the cultural, historical, and immigration histories of fathers in relation to infant birth outcomes [18–22]. In this study, we focus on mothers and fathers immigration histories, race/ethnicity, paternal involvement at birth, socioeconomic status, and maternal smoking status as it relates to infant birth outcomes. By bringing together all these factors into one investigation we are better able to explain the disparities in the birth outcomes of infants born to US and foreign born parents.

Methods

This investigation is a secondary data analysis on all births to women of European and African ancestry, both native-born and foreign-born, in a 21 birth hospital region of Central New York State from 1996 to 2003. These births were recorded in the Central New York Perinatal Data System, a population-based birth registry that captures all birth certificate information and additional quality improvement data items for use by maternal and child health administrators, planners and evaluators. Approval for this study was obtained by the SUNY Upstate IRB. For the purpose of this investigation, this study included only singleton infants (n = 146,431) because twins and higher order multiple births are strongly associated with low birth weight.

Independent Variables

Sociodemographic Characteristics

The study includes three maternal sociodemographics characteristics. Self identified maternal race was coded as a dichotomous variable (African ancestry/European ancestry); maternal socioeconomic status was measured as a dichotomous (Yes/No) variable based on whether or not the patient received Medicaid (indicating lower-income); and mothers's self identified natality was coded as a dichotomous variable (foreign born/native born).

Health-Related Variables

Tobacco use during pregnancy was measured as a dichotomous (Yes/No) variable. Data about tobacco use was based on maternal self-report that was documented in the PDS (Perinatal Data System).

Paternal Variables

Two items relating to the baby's father were included in the analysis. The first item was father's natality which was assessed as a dichotomous variable (foreign born/native born). The second item was information about paternity which was assessed by the presence of the father's name on the baby's birth certificate (yes/no). This item was considered a proxy measure of paternal involvement at the time of the birth. If the new mother was married to the baby's father, his demographic information was automatically included on the baby's birth certificate as well as in the PDS. In the case of unmarried births, new mothers were given a Declaration of Paternity (DP) form by a Vital Records staff member after the delivery. The forms were left at the unmarried mother's bedside during her hospital stay, which in Syracuse averages about 2 days following birth. If the baby's father completed and signed the DP form, his information was entered into the PDS database by hospital staff upon the mother's discharge. If the father did not sign the DP, the paternal demographic information— date of birth, age, and race/ethnicity was not recorded in the PDS. If the father signed the DP at a later date after the mother's discharge from the hospital following childbirth, his information was not recorded in the PDS.

Our research team conducted qualitative interviews with the new mothers on the reasons why some fathers did not sign the DP [22]. Mothers indicated several reasons for the baby's father not signing the DP: (1) Separation from their babies fathers and the mother not wanting his involvement, (2) The mother's receipt of public assistance and not wanting to jeopardize that by stating the father's name, (3) Fathers inability to afford mandated child support payments, especially if they have other children, (4) Mothers were teen mothers and the fathers were much older and hence fearful of being charged with sexual assault [7]. Fathers were incarcerated and not present to sign the DP.

Although an unsigned DP may suggest a reduction in the amount of paternal financial and social support available to the woman and her baby at the time of the birth, it does not provide a true marker for father involvement for the reasons indicated above. However, previous studies have found that when the father's information is lacking from the birth certificate, the indicators of poor birth outcomes are higher [23]. [end page 1351].

Plan of Analysis

We used 2-tailed t-tests for continuous variables (birth weight) and relative risk tests and chi squares for discrete and dichotomous variables. Descriptive analyses, both frequencies and cross-tabulations, initially demonstrated which variables were associated with the outcome, low birth weight. Separate bivariate associations were assessed to determine potentially confounding variables. Significantly associated variables were then entered into logistic multiple regression model, with low birth weight as the outcome and fathers' natality as the exposure variable.

Results

Nature of Immigrants in the Study Sample

Central New York counties represented in the database include St. Lawrence, Oswego, Onondaga, Cayuga, Brome, Jefferson, Oneida, Cortland, Tomkins, Lewis, Madison, Chenango, and Tioga. These counties have a combined population of 1,668,899, of which 4.4% was found to be foreign born in the 2000 US census. The foreign born population is disproportionately located in clusters, with Onondaga County having over 35% of the total foreign born residents of these counties and the city of Syracuse having 16% of the total foreign born. A second major cluster is in Oneida County, where 17% of Central New York's foreign born populations reside. Table 1 presents the nations from which the foreign born fathers in our study emigrated.

Foreign born individuals come into the United States via a various pathways, including voluntary migrants, refugees, and undocumented labor migrants. Voluntary migrants include foreign students, who attend the many universities in Central New York and may give birth during their university study. Other voluntary migrants include educated professionals, such as physicians or computer specialists, whose entry into the United States is facilitated by the desirability of their professional skills. Still others, through a process of chain migration, come to join family members who settled here earlier. Voluntary migrants who have financial resources, education, and/or supportive= family to receive them may have good health outcomes simply due to their economic and social resources.

Refugees, however, have often been through unspeakable trials on their path to the United States. Many refugees flee their home areas with little more than the clothes they are wearing. They may stay in a country or area of first asylum for months or years, while waiting for permission to enter the U.S. Many have lost family members, speak little or no English upon arrival, and often lack formal

Table 1 Birth countries of foreign born fathers in the study

European ancestry: 116 countries (ranked order of those with >100)	
Bosnia	554
Germany	489
Canada	452
Ukraine	415
UK	229
Belarus	218
Italy	210
Mexico	158
Israel	148
Russia	124
Polland	118
Lebanon	105
African Ancestry: 77 countries (ranked order >/=20)	
Jamaica	150
Haiti	54
Somalia	46
Sudan	36
Ghana	32
Guyana	31
Liberia	26
Kenya	21
Nigeria	20

education. Some refugees are illiterate in both their native language as well as English. Syracuse is home to two major refugee resettlement agencies, each with a network of families and faith communities that volunteer to help resettle asylum seekers. A third refugee resettlement agency in Oneida County is the Mohawk Valley Resource Center [24]. Because of these resettlement agencies, a large proportion of the foreign born in Central New York are refugees. Since 2000, young males from South Sudan, members of the so-called ''lost boys of Sudan'' contingent, Liberian war orphans, and over 300 Somali Bantus, among numerous others, are in the process of adjusting to very different conditions than they have previously experienced [25]. More recently, Mohawk Valley has helped to resettle an increasingly diverse population of refugees from countries in the former Soviet Union and the horn of Africa. Newly arrived individuals, some from near the equator, learn to cope with several months of deep snow every year. Hospitals and other clinical services struggle to provide adequate translation for patients from a very diverse variety of linguistic groups.

Table 2 compares the percentage of foreign and US born mothers by race, low birth weight infants, smoking, and Medicaid insurance or self pay (as a proxy for poverty). More women of African American ancestry gave birth to low birth weight infants (11.1%), than any other group. [end of page 1352]

Table 2 Comparison of foreign and US born mothers by the percent of low birth weight, smoking, and Medicaid insurance/self pay

All singletons $N = 146{,}431$	US born white mother (129,975)	Foreign born white mother (5,205)	US born African American mother (10,667)	Foreign born African ancestry mother (764)
% LBW	5%	3.8%	11.1%	7.3%
% Smoking	23.4%	11.3%	24.8%	6%
Medicaid/self pay	33%	35%	65%	46%

Native born White and African American mothers had much higher rates of smoking during pregnancy, at nearly one quarter of all births. More native born African American women were poor (65%), as indicated by Medicaid status, compared to White (33% native born and 35% foreign born) and foreign born African mothers (46%).

Table 3 presents the mean birth weight, percentage of low birth weight infants, by the natality and race of the mothers, natality of their babies' fathers, and whether the father signed the birth certificate. Among mothers with African ancestry and European ancestry (both US born and foreign born), the percentage of babies with low birth weight was the highest among births where fathers' information was missing (US born White mothers—7.6 versus 4.6 versus 4.2%; Foreign born White mothers: 5.0 versus 4.1 versus 2.9%; US born African American mothers: 12.2 versus 10.3 versus 8.9%; Foreign born African ancestry: 7.9 versus 7.4 versus 7.0%). Infants with US born fathers were more likely to be born with low birth weight than those with foreign born fathers. This finding held up irrespective of mothers natality and her race/ethnicity (4.6 versus 4.2%, 4.1 versus 2.9%, 10.3 versus 8.9%, 7.4 versus 7.0%).

We performed bivariate analysis (using relative risk ratios because this is a population data set) stratified by maternal race. Among all white women (both US born and foreign born), infants of US fathers had higher LBW than those of foreign born fathers (Relative risk = 1.41 (1.19\RR\1.65) P\0.0001). Among all African ancestry women (both US born and foreign born), infants of US fathers had higher LBW than those of foreign born fathers (Relative risk = 1.37 (1.03\RR\1.83) P\0.03).

We conducted a logistic regression analysis among all singleton births with birth weight as the outcome variable. The exposure variable was paternal natality (native born vs. foreign born). We included as covariates maternal natality (native born vs. foreign born), maternal race (European ancestry vs. African ancestry), tobacco use (yes vs. no), and Medicaid/self pay insurance (yes vs. no), because these variables were found to be significantly associated with low birth weight in the bivariate analyses. As presented in Table 3, fewer infants born to foreign born fathers had low birth weight (OR: 1.15) (Table 4).

Discussion

To our knowledge our study is the first to have assessed the effects of foreign-born status of fathers on infant birth weight. Previous work on immigrant fathers has examined the many social, economic and linguistic stresses they face

Table 3 Comparison of Declaration of Paternity (DP), percentage of low birth weight (LBW), and mean birth weight (gms.) by parental natality

All singletons $N = 146,431$	US born white mother (129,795)	Foreign born white mother (5,205)	US born African American mother (10,667)	Foreign born African ancestry mother (764)
No father listed (no DP)	$N = 16,628$ (15.1%)	$N = 240$ (4.6%)	$N = 4,789$ (44.9%)	$N = 151$ (19.8%)
% LBW	7.6%	5.0%	12.2%	7.9%
Mean birthweight (gms.)	3,299	3,330	3,120	3,158
Father listed: US born father (DP)	$N = 110,241$ (84.9%)	$N = 2,470$ (47.5%)	$N = 5,530$ (57.8%)	$N = 243$ (31.8%)
% LBW	4.6%*	4.1%**	10.3%	7.4%
Mean birthweight (gms.)	3,451	3,460[$]	3,181	3,263
Father listed: Foreign born father (DP)	$N = 2,926$ (2.3%)	$N = 2,495$ (47.9%)	$N = 348$ (3.3%)	$N = 370$ (48.4%)
% LBW	4.2%*	2.9%**	8.9%	7.0%
Mean birthweight (g)	3,442	3,528[$]	3,194	3,290

* Foreign born fathers relative risk of lbw infants, compared with US born fathers = 0.795% CI 0.51–0.96, $P < 0.05$

** Foreign born fathers relative risk of lbw infants, compared with US born fathers = 0.7 95% CI 0.51–0.96, $P < 0.05$

[$] Foreign born fathers with higher mean birthweights than infants of US born fathers, Students T-test, $P < 0.0001$

[end of page 1353]

Table 4 Logistic regression analysis with parents' natality, race, smoking, and medicaid insurance/self pay as predictors of birth weight

	Sig. P-value	Odd's ratio	95.0% C.I.	
			Lower	Upper
Father's birthplace: US versus foreign	0.034	1.15	1.011	1.302
Mother's birthplace: US versus foreign	0.009	1.20	1.047	1.374
Maternal race (European ancestry vs. African ancestry)	0.000	0.50	0.464	0.544
Medicaid/self pay (Yes/No)	0.001	1.09	1.039	1.148
Smoking (Yes/No)	0.000	1.81	1.717	1.904

in the United States [26]. This paper reports better-than expected birth weight outcomes for infants of foreign-born fathers, as well as foreign-born mothers after controlling for the race and birthplace of the mother, tobacco use and Medicaid. Our study demonstrates that fathers matter and that foreign born fathers and mothers are associated with giving birth to fewer low birth weight infants.

The results of this investigation can be analyzed from the perspective of the theory of stress age [27]. When understood from the perspective of this theory, infant birth disparities can be explained through the concept of ''weathering'' which occurs as a result of women's exposure to a lifetime of acute and chronic stressors which in turn brings about decline in maternal health and increases the odds of delivering LBW and SGA infants [28, 29]. Preterm births and higher infant mortality are also common pregnancy outcomes for women who experience stress associated with weathering. Studies indicate that stress associated with racial and gender discrimination is particularly salient for minority women and these stressors too can have a negative effect on the body and in turn impact pregnancy outcomes [27, 29]. The weathering hypothesis is mostly addressed from the point of view of mothers but can be extrapolated to explain the role of fathers and infant birth outcomes. Fathers' experience of socioeconomic disadvantage, violence, and other societal and structural stressors in their countries of origin can also impact infant birth outcomes. But as mentioned earlier, foreign born fathers may belong to a more robust group of men who survived the stress and challenges in their countries of origin (''healthy migrant'' or ''epidemiological paradox'').

The weathering hypothesis finds support in this study with native born populations and not with the foreign born mothers and fathers. This study, like several previous studies, found that foreign born women have lower rates of low birth weight than their native born counterparts. It is possible that the better birth outcomes of infants of foreign born mothers results from better diets; lower smoking, alcohol consumption, and illicit drug use; or other favorable health behaviors. Additionally, United States immigration policy gives preference to highly-skilled, educated, and wealthy immigrants as employees, investors, or students. However, many of the foreign born African ancestry individuals in our study came to the United States as refugees from the horn of Africa and other areas of civil conflict such as Sudan and Liberia. Many arrive without literacy even in their native languages, having

experienced violence and deprivation, and having fled their homes often with just the clothes they were wearing. A potential explanation for the foreign born advantage of women of African ancestry is the effect of lifelong exposure to racism that native born African ancestry individuals have suffered. United States natality and residence is associated with worse health for the infants of African American mothers, compared with those of foreign born African ancestry mothers.

The different birth outcomes of these two groups may be only partially a result of individual-level health behaviors of the foreign born parents. Theoretical frameworks such as the life course theory and bio ecological framework could also help explain the findings [30, 31]. These frameworks help explain how individuals' life experiences and their current and past environments shape their functioning and their perceived role as parents. Ecological factors, including discrimination and disadvantage, may be important risk factors for low birth weight among infants of African American women.

There are limitations to our study. First, because it is a secondary data analysis we were not able to add to r change the variables that had been collected. Second, the assessment of natality was based on self-reports and independent verification of status was not conducted, Hence, it is possible that parents may not have accurately reported or have disguised their natality status. Future work is needed to elucidate the behavioral and social determinants of the better birth outcomes of foreign born parents.

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