Birth Outcomes among Sub Saharan African Immigrants in Canada and the United States:

A Test of the Healthy Immigrant Effect

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Short Abstract

We examined differences in mean term birthweight and rates of very low (VLBW) and low birthweight (LBW) for infants born to Sub-Saharan African (SSA) immigrants in Canada versus the US. SSA immigrants in the US had a 53.2 gram deficit in birthweight compared to their counterparts in Canada. Comparison of individual sending countries revealed that immigrants from Congo had the highest birthweight deficit (-89.9 grams) while immigrants from Eritrea had the lowest (-20.1 grams). There were trivial cross-national differences in VLBW/LBW by select sending countries, with the exception of Congolese immigrants in Canada who had significantly lower odds of LBW than their counterparts in the US. Native-born Canadians also had higher mean birthweights and lower odds of VLBW and LBW than native-born Americans. The results suggest that both state selection of healthy migrants and availability of universal healthcare may account for the better health of SSA immigrants in Canada.

Extended Abstract

BACKGROUND

Birthweight is a widely used indicator of perinatal and population health (Urquia & Ray, 2012). In fact, low birthweight (<2500 grams at birth), has been identified by the Centers for Disease Control and Prevention (CDC) as a major health problem given its association with infant mortality and morbidity. Examining disparities in low birthweight, by race/ethnicity, socioeconomic status (SES) and other social categories such as nativity status can provide important insights into possible sources of structural inequality in society (Conley & Bennett, 2000). Additionally, birthweight is well measured in most countries and as such is probably the best perinatal health indicator to use for cross-national comparisons.

In this paper, we contribute to the literature on immigrant health by comparing birthweight outcomes (mean term birthweight, the proportion of very low birthweight, and the proportion of low birthweight) for infants born to Sub Saharan African (SSA) immigrants from eight countries who settled in Canada versus those who settled in the United States. We also contrast the birth weight outcomes of the immigrant women, overall and by individual sending countries, with native-born women in each receiving country. These two contrasts provide a test of possible health selection mechanisms that may explain the healthy immigrant effect, namely state selection of the healthiest immigrants. Additionally, we compare birth outcomes of the native-born women in each country, which enables us to test possible country-level differences in healthcare provision.

METHODS

Data & Study Population

Data on live births in Canada from Statistics Canada's live births database for the years 1990-2005 were used (Fair & Cyr 1993). We pooled the data across 16 years in order to produce sufficient sample sizes to assess differences in birthweight outcomes by mother's country of birth. Ethics approval was not legally required since data are anonymized and all analyses were conducted in restricted access Research Data Centers (RDC). However, approval for this study was provided by Statistics Canada and RDC guidelines for release and presentation of data results were followed. Births to women residing in Ontario were excluded because of known data quality issues and lack of complete birth certification (Joseph & Kramer 1997; Health Canada 2008).

The US data comes from 2007-2008 vital statistics birth records, provided by the National Center for Health Statistics (NCHS). Only states that have implemented the 2003 revision of the US birth certificate (Martin et al., 2010) were included because detailed information on the mother's country of birth is not available for birth records from states that had not yet implemented the 2003 revision of the birth certificate. We obtained IRB approval for this study from the Institutional Review Board of the University of Pennsylvania. We also received approval from the National Association for Public Health Statistics and Information Systems (NAPHSIS) for information on the mother's country of birth.

Our study population consists of native-born women and foreign-born women from eight Sub-Saharan African countries: Cameroon, Congo, Eritrea, Ethiopia, Ghana, Nigeria, Senegal, and

Somalia. These countries were selected because (a) there were sufficient sample sizes (>400 births) available in both the US and Canadian data sets and (b) 90% or more of the women from these countries in our US data reported a non-Hispanic black race. Given the persistent black-white racial gaps in infant health in the US (Martin et al. 2012; Sastry & Hussey 2003), the documented health advantage of foreign-born blacks (Acevedo-Garcia, Soobader & Berkman 2005; Cabral et al, 1990; David & Collins, 1997; Elo, Vang & Culhane, 2014; Vang & Elo, 2013), and the racial heterogeneity of African immigrants (REF), we decided to restrict the sample of foreign-born women to "black immigrants" in order to produce meaningful within- and cross-country comparisons. However, since information on race/ethnicity is not available on the Canadian birth certificate, we used information on race/ethnicity and mother's country of birth on the US birth certificate to guide us in selection of countries with predominantly black immigrants.[1]

In each receiving country, we further restricted the sample to singleton births among native-born and SSA-born women who are residents of each country (i.e., excludes tourists/visitors who delivered in Canada/USA). In the US data, the native-born population included only mothers who live in the US 50 states and Washington D.C.. Births with missing information on birthweight and gestational age were deleted as were births with gestational ages outside the range of 20-44 weeks. We also deleted births with birthweights exceeding 5999 grams. A lower bound for birthweight was not imposed because we are interested in very low birthweight infants.

Outcomes

Our measures of infant health are: (a) mean birthweight for term (>=37 completed weeks gestation) infants; (b) very low birthweight (VLBW, <1500 grams); and (c) low birthweight (LBW, <2500 grams).

Independent Variables

Maternal birthplace is our key independent variable. For the native-born women, we distinguish between those born in Canada (Canada-born) and those born in the USA (US-born). We further categorize the US-born women into US-born non-Hispanic white and US-born non-Hispanic black sub-populations to enable more meaningful within-country comparisons. The foreign-born women were categorized according to their country of birth: Cameroon, Congo, Eritrea, Ethiopia, Ghana, Nigeria, Senegal, and Somalia.

In addition to mother's place of birth, we include the following potential confounding variables: infant sex (male vs. female), maternal age (<20, 20-24, 25-34, and 35+), marital status (married vs. unmarried), parity (1st birth, 2nd & 3rd birth, and 4th & above), gestational age (20-31, 32-36,

[1] We did not restrict the US immigrant sample to only non-Hispanic black immigrants (even though this was possible to do given that we had information on race/ethnicity on the US birth certificate) because it might bias the cross-country comparisons. For example, 93% of the Ethiopia-born women reported a non-Hispanic black race. If we included only these non-Hispanic black immigrant women in our US sample, they would not be comparable to Ethiopia-born women residing in Canada, of whom the majority may be black as well but there would be a small proportion who are not black. Thus, in order to ensure that we are comparing apples with apples, our US analytical sample includes all foreign-born women, regardless of race, who reported one of the eight select Sub Saharan African countries as their birth country.

37-41, and 42-44), and race/ethnicity (US only) (non-Hispanic white, non-Hispanic black, Hispanic, and non-Hispanic other).

Analysis Plan

Canadian and US birth record data were not combined for direct analysis due to data access restrictions. Instead, parallel analyses were conducted with the US and Canadian, separately.

Three types of contrasts are made. First, for the cross-national comparison we contrast aggregate estimates of birthweight outcomes for SSA immigrant women living in Canada versus the US with mean differences, odds ratios, and 95% confidence intervals. SSA immigrants are analyzed as a group and by individual sending countries. We also compare native-born Canadians to all native-born Americans and native-born non-Hispanic whites and blacks.

Second, within each country we compare the birth weight outcomes of SSA immigrants, overall and by individual countries, to those of native-born women. In Canada the native-born population consists of all women born in Canada, regardless of race/ethnicity. In the US, we compare SSA immigrants to all native-born American women as well as native-born non-Hispanic whites and blacks.

Finally, we will compare rates of LBW between non-migrants in the eight Sub-Saharan African sending countries with their migrant counterparts who settled in Canada and the US. We will use published data (UNICEF 2004) for estimates of LBW among non-migrants in the sending countries.

Hypotheses

We expect that SSA immigrants in Canada will have better birth outcomes than SSA immigrants in the US because of the Canadian immigration point system, which selects immigrants on the basis of human capital (Knowles, 2007). This state imposed positive selection means that (at least in theory) only healthy economic migrants are allowed into the country. It is also possible for SSA immigrants to by-pass the point system and enter Canada through the family or refugee class mechanisms; in which case, state imposed selection is not an issue and SSA immigrants' in Canada may not be very different from SSA immigrants in the US.

However, a difference in immigration policy is not the only factor that distinguishes Canada from the US. Unlike the US, Canada has an established policy of universal health insurance coverage (Zuberi, 2006). Thus, public insurance in Canada enables both immigrants and native-born Canadians equal access to health services. Access does not entirely translate into actual use of health services and equality of care received however, as linguistic, cultural and other barriers to healthcare (e.g., discrimination) have been documented for some immigrants in Canada (e.g., refugees, the elderly, Muslim women) (REFS). Nonetheless, research has shown that uninsured immigrants in the US have more self-reported unmet medical needs and lack a medical doctor compared to immigrants in Canada (Siddiqi, Zuberi & Nguyen, 2009). This means that, healthcare access barriers notwithstanding, even lower human capital—and by extension, less healthy—SSA immigrants in Canada may have access to prenatal care and other health services during pregnancy. As such we expect that this structural difference in health insurance coverage and healthcare access would translate into better birth outcomes for SSA immigrants in Canada.

PRELIMINARY RESULTS

As seen in Table 1, maternal characteristics of SSA immigrants in Canada and the US are similar, with one exception. SSA immigrant women in the US tend to bear children at slightly older ages than those in Canada: 25.9% vs. 16.9% gave birth at age 35 and older. The overwhelming majority (92.9%) of SSA immigrant women in the US are black. Among women who reported a non-black race, the majority are non-white and non-Hispanic. Comparable racial data is not available for the SSA immigrants in Canada. However, it is not unreasonable to expect that a similar racial distribution may be found among the SSA immigrants living in Canada as well. We know of no studies to date that show differential migration patterns by race for SSA immigrants going to Canada versus the United States.

Table 2 shows the unadjusted mean term birthweight by mother's country of birth and country of settlement. The US serves as the reference group for the cross-national comparison. In general, SSA immigrants in Canada tend to have heavier babies than their counterparts in the US. There is a sizable birthweight deficit of 53.2 grams for SSA immigrants in the US versus those in Canada. Examination of the individual SSA countries show that the biggest cross-national birthweight gap is found among Congolese immigrants (-89.9 grams) whereas Eritrean immigrants have the smallest gap (-20.1 grams).

Among the native-born women, infants born to American mothers weighed about 115.9 grams less than infants born to Canadian mothers. However, the birthweight deficit was substantially smaller between native-born Canadian mothers and native-born non-Hispanic white American mothers (-71.2 grams). In contrast, the birthweight gap between native-born non-Hispanic black American mothers and native-born Canadian mothers was 279.5 grams, a two-fold increase from the gap observed for all native-born American women.

We also tried to control for potential confounding factors that may affect birthweight by computing mean term birthweights for each strata of our maternal sociodemographic covariates (Table 3). This analysis was restricted to SSA immigrant women in Canada and the US. Across all maternal characteristics, SSA immigrants in the US had lighter babies than SSA immigrants in Canada.

Rates of VLBW and LBW by mother's country of birth for women in Canada and the US are shown in Table 4. As a group, SSA immigrants living in Canada are more likely to have VLBW infants compared to comparable their counterparts in the US (1.27, CI 1.05, 1.53). However, cross-national comparisons of VLBW for immigrants from individual sending countries were not statistically significant, probably due to very small sample sizes. SSA immigrants in Canada and the US did not differ in terms of LBW risk, however. The only exception is Congolese immigrants in Canada who had 33% lower odds of LBW than their counterparts in the US.

Among the native-born women, the odds of VLBW and LBW among Canadian mothers were 0.82 (CI 0.80-0.83) and 0.70 (CI 0.70-0.71) times that of native-born American mothers. However, native-born Canadian mothers had significantly higher odds of VLBW relative to native-born non-Hispanic white mothers (1.12, CI 1.10-1.14) and substantially lower odds of VLBW compared to native-born non-Hispanic black mothers (0.36, CI 0.35, 0.37). Native-born Canadian mothers had significantly lower odds of LBW than either native-born non-Hispanic

white and black mothers. But the magnitude of the health disadvantage among native-born non-Hispanic black women was more pronounced.

NEXT STEPS

In subsequent analysis, we will compare differences in VLBW and LBW risks for SSA immigrants, as a group and by individual sending countries, to the native-born population(s) in each settlement country. We will also analyze rates of LBW between SSA immigrants in Canada and the US versus non-migrants in the sending countries.

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Table 1. Maternal characteristics by maternal birthplace and settlement country

	CANADA		USA			
	Canada-born	SS Africa-born (from 8 select countries, residing in Canada)	All USA-born	USA-born White	USA-born Black	SS Africa-born (from 8 select countries, residing in USA)
No of singleton births	2,853,696	9,012	3,591,577	2,345,952	528,688	21,295
Infant sex, %						
Male	51.28	50.53	51.21	51.3	50.86	51.53
Female	48.72	49.47	48.79	48.7	49.14	48.47
Age, %						
<20	7.03	1.61	12.2	8.19	19.28	2.08
20-24	21.59	13.25	26.91	24.02	34.06	12.08
25-34	60.64	68.21	48.55	53.27	38.49	59.99
35+	10.73	16.93	12.34	14.53	8.17	25.85
Marital status, %						
Married	56.5	77.67	58.02	69.28	23.59	76.46
Unmarried	43.5	22.33	41.98	30.72	76.41	23.54
Parity, %						
First birth	44.09	30.68	42.5	42.8	40.6	34.79
2nd & 3rd birth	48.47	46.33	47.1	48.25	44.55	46.41
4th & above	7.45	17.59	10.41	8.94	14.84	18.8
Gestational age, %						
20-31	1.03	1.85	1.64	1.23	3.36	1.93
32-36	5.29	5.75	9.27	8.22	12.86	8.65
37-41	91.25	89.28	84.09	85.41	79.34	84.69
42-44	2.42	3.12	5.01	5.13	4.45	4.72
Race/ethnicity, %						
Non-Hispanic white	---	---	65.32	100	---	1.71
Non-Hispanic black	---	---	14.72	---	100	92.85
Hispanic	---	---	17.04	---	---	0.41
Non-Hispanic Other[1]	---	---	2.92	---	---	5.02

Table 1, continued. Maternal characteristics by maternal birthplace and settlement country

Notes. Select countries include Cameroon, Congo, Eritrea, Ethiopia, Ghana, Nigeria, Senegal, and Somalia. Countries were included in the analysis if (a) there were sufficient sample sizes (N>400) and (b) 90% or more of the mothers born in these countries in our US data reported non-Hispanic black as their race on the US birth certificate. Since the focus of our study is black immigrant birth outcomes (and information on mother's race/ethnicity is not available on the Canadian birth certificate), this country selection criteria enables us to use maternal birthplace as a proxy for black race in our comparative analysis.

Data for Canada are based on singleton live births, 1990-2005 from the Canadian Birth Registry. Data for the USA are based on singleton live births from the 2007-2008 NCHS Natality files.

[1]Includes all other races and births where the mother's race/ethnicity is unknown/missing.

Table 2. Unadjusted mean birthweight for term infants (gestation >= 37 weeks) by mother's country of birth and country of settlement

	CANADA				USA				Canada vs. US
	N	Mean birthweight	Std Error	Diff. from native-born group	N	Mean birthweight	Std Error	Diff. from native-born groups	Birthweight difference (95% CI)
All native-born	2,673,469	3495.5	0.294	(reference)	3199927	3379.6	0.26	(reference)	-115.9 (-115.9, -115.9)
USA-born white					2124201	3424.3	0.32	(reference)	-71.2 (-71.2, -71.2)
USA-born black					442980	3215.9	0.69	(reference)	-279.5 (-279.5, -279.5)
All SS Africa-born[1]	8329	3476.8	5.184	+	19040	3423.5	3.41	* #	-53.2 (-53.3, -53.1)
Cameroon	464	3508.2	20.496		765	3455.1	16.33	* #	-53.1 (-53.4, -52.8)
Congo	1060	3496.1	14.545		597	3406.1	19.94	#	-89.9 (-90.3, -89.5)
Eritrea	489	3497.1	20.097		694	3477.0	17.37	* ^ #	-20.1 (-20.4, -19.8)
Ethiopia	1803	3530.6	11.13	+	3886	3496.1	7.43	* ^ #	-34.5 (-34.6, -34.4)
Ghana	1150	3403.5	14.014	+	2341	3328.5	9.67	* ^ #	-74.9 (-75.1, -74.8)
Nigeria	1087	3473.7	14.627		5740	3443.8	6.24	* ^ #	-29.9 (-30.0, -29.8)
Senegal	379	3373.9	23.363	+	808	3304.4	15.93	* ^ #	-69.5 (-69.8, -69.2)
Somalia	1897	3468.6	10.941	+	4209	3392.6	7.18	^ #	-76.0 (-76.1, -75.9)

Notes. USA is the reference group for the country of settlement comparison (Panel 3). Within each settlement country, we also compared Sub Saharan Africa-origin immigrants (as a group and by individual country) to the native-born population(s) (reference).

[1]Total singleton births from women born in 8 selected Sub Saharan Africa countries.

+ significantly different from Canadian-born at p<0.05 level

* significantly different from all US-born at p<0.05 level

^ significantly different from US-born, non-Hispanic white at p<0.05 level

significantly different from US-born, non-Hispanic black at p<0.05 level

Table 3. Unadjusted mean birthweight for term infants (gestation >= 37 weeks) by potential confounding factors, Sub Saharan-Africa-origin mothers residing in Canada vs. USA

	SUB SAHARA AFRICA-BORN MOTHERS (RESIDING IN CANADA)			SUB SAHARA AFRICA-BORN MOTHERS (RESIDING IN USA)			Canada vs. US
	N	Mean birthweight	SE	N	Mean birthweight	SE	Birthweight difference (95% CI)
Infant sex							
Male	4206	3543.9	7.4	9803	3482.8	4.8	-61.1 (-61.2, -61.0)
Female	4122	3408.3	7.1	9237	3360.7	4.8	-47.6 (-47.7, -47.5)
Age							
<20	127	3278.8	42.5	374	3245.5	20.7	-33.3 (-34.5, -32.1)
20-24	1105	3414.5	13.9	2312	3336.2	9.5	-78.3 (-78.6, -78.1)
25-34	5715	3484.6	6.2	11575	3436.9	4.3	-47.7 (-47.8, -47.6)
35+	1381	3512.2	13.3	4779	3447.3	7.1	-64.9 (-65.1, -64.7)
Marital status							
Married	6474	3478.0	5.9	14644	3431.7	3.9	-46.3 (-46.4, -46.2)
Unmarried	1855	3471.2	16.5	4396	3396.5	7.0	-74.7 (-74.9, -74.5)
Parity							
First birth	2950	3403.7	8.6	6429	3361.4	5.9	-42.3 (-42.4, -42.2)
2nd & 3rd birth	3866	3501.0	7.5	8646	3446.4	4.9	-54.6 (-54.7, -54.5)
4th & above	1465	3560.2	12.8	3426	3480.1	8.2	-80.1 (-80.3, -79.9)

Note. USA is the reference group for the country of settlement comparison.

Table 4. Rates (%) of very low birthweight (VLBW, <1500 grams) and low birthweight (LBW, <2500 grams) by mother's country of birth and country of settlement

	SETTLEMENT COUNTRY										Canada vs. US	
	CANADA					USA					VLBW	LBW
	N	% VLBW	SE_{VLBW}	% LBW	SE_{LBW}	N	% VLBW	SE_{VLBW}	% LBW	SE_{LBW}	OR (95% CI)	OR (95% CI)
All native-born	2,862,926	0.93	0.000	4.72	0.000	3591577	1.13	0.000	6.60	0.000	**0.82 (0.80, 0.83)**	**0.70 (0.70, 0.71)**
(USA only):												
Native-born white						2345952	0.83	0.000	5.38	0.000	**1.12 (1.10, 1.14)**	**0.87 (0.86, 0.88)**
Native-born black						528688	2.52	0.000	12.00	0.000	**0.36 (0.35, 0.37)**	**0.36 (0.36, 0.37)**
All SS Africa-born[1]	9,014	1.85	0.001	5.70	0.002	21295	1.47	0.001	6.02	0.002	**1.27 (1.05, 1.53)**	0.94 (0.85, 1.05)
Cameroon	491	2.04	0.006	4.68	0.010	845	1.78	0.005	5.80	0.008	1.15 (0.51, 2.58)	0.80 (0.48, 1.33)
Congo	1148	1.74	0.004	5.57	0.007	681	2.06	0.005	8.08	0.010	0.84 (0.42, 1.68)	**0.67 (0.46, 0.98)**
Eritrea	526	1.52	0.005	5.51	0.010	768	0.91	0.003	5.47	0.008	1.68 (0.61, 4.66)	1.01 (0.62, 1.64)
Ethiopia	1967	1.78	0.003	5.13	0.005	4294	1.28	0.002	4.84	0.003	1.40 (0.91, 2.14)	1.06 (0.83, 1.36)
Ghana	1288	2.80	0.005	8.31	0.008	2716	2.54	0.003	8.80	0.005	1.10 (0.73, 1.66)	0.94 (0.74, 1.19)
Nigeria	1177	2.21	0.004	6.12	0.007	6362	1.51	0.002	5.67	0.003	1.47 (0.95, 2.28)	1.08 (0.83, 1.41)
Senegal	406	2.22	0.007	6.40	0.012	908	1.10	0.003	7.60	0.009	2.04 (0.82, 5.05)	0.83 (0.52, 1.33)
Somalia	2011	1.14	0.002	4.57	0.005	4721	1.00	0.001	5.51	0.003	1.15 (0.70, 1.90)	0.82 (0.64, 1.05)

Note. USA is the reference group for the country of settlement comparison.

[1]Total singleton births from women born in 8 selected Sub Saharan Africa countries.