

Perinatal risk factors and birth outcomes of newly arrived refugees in Minnesota, 2012-2024

Lily Rubenstein, BSN, RN¹; Kailey Urban, MPH¹; Sherri Fong, MPH²; Maryam Hameed, MD²; Allison Newman, MD² | ¹Minnesota Department of Health; ²University of Minnesota Department of Family Medicine and Community Health



Lily Rubenstein
Refugee Health Program | Minnesota Department of Health
lrubenstein@state.mn.us | www.health.state.mn.us
651-201-5414

Background

- Several studies have identified improved birth outcomes for immigrant populations as compared to non-immigrants, known as the “immigrant paradox.”
- Few studies have assessed risk factors and birth outcomes for individuals known to be refugees.
- No studies have assessed outcomes in temporal relation to date of arrival in the U.S.
- To better understand the impact of new refugee status, we examined prenatal risk factors and birth outcomes among Minnesota (MN) primary refugees who gave birth within one year of their U.S. arrival date.

Methods

Data Sources and Population

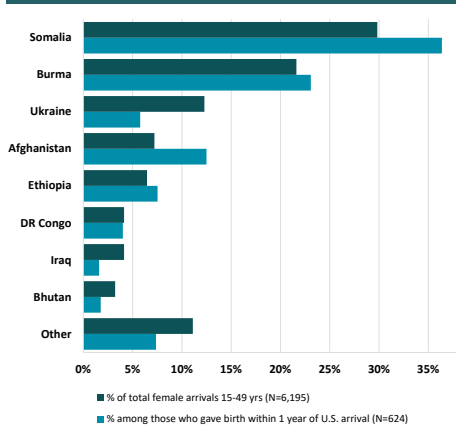
- Study Population:** Female primary refugees to MN from 2012-2023 aged 15-49 years at the time of U.S. arrival. Refugees include all individuals eligible for benefits from the Office of Refugee Resettlement.
- Comparison Population:** All singleton births occurring in MN from 2012-2024. Data was obtained from MN birth records.
- Data Linkage:** Refugee Health Program records were matched to MN birth records (2012–2024) to identify births occurring within one year of U.S. arrival. We included 2024 birth records to allow 2023 refugee arrivals a full calendar year to deliver.

Statistical Analysis

- Standardized Rate Ratios (SRR):** Calculated to compare pregnancy and birth outcomes among refugees to aggregate statewide data (2012–2024).
 - SRR is the ratio of observed events in the study cohort to expected events based on general population rates.
 - Rates were stratified by age, education level, race, and insurance status.
 - 95% confidence intervals (CIs) were derived using exact Poisson methods based on observed event counts.

Results

Figure 1. Distribution of total female primary refugee arrivals to MN aged 15–49 years vs. distribution of post-arrival births by country of origin



- 624 out of 6,195 (10.1%) refugee females ages 15-49 years gave birth within 1 year of arrival. Analysis was limited to only singleton deliveries. 9 multiple births were excluded.
- The median time from U.S. arrival to delivery was 244 days (range: 5-365 days).
- The country of origin among all refugee women 15-49 years compared to those who gave birth within 1 year are described in Figure 1.

Demographics Compared to General MN Birthing Population

- Refugee women were more likely to be younger, non-White, not have a high school degree, multiparous, and utilize Medicaid (Table 1).

Pregnancy Risk Factors and Outcomes Compared to General MN Birthing Population (Table 2)

Pregnancy Risk Factors:

- Protective Factors:** Refugees were less likely to smoke, have gestational diabetes, hypertension (pre-pregnancy or gestational), or a history of preterm/cesarean-section births.
- Increased Risks:** Refugees had a higher likelihood of pregnancy anemia and Hepatitis B infection.

Birth Outcomes:

- Multiparous refugees were more likely to deliver vaginally (SRR: 1.12; 95% CI: 1.01-1.23).
- No significant difference in cesarean-section rates for nulliparous women.

Neonatal Outcomes:

- Improved Outcomes:** Lower rates of preterm birth, low birth weight, and Neonatal ICU admission.
- Higher likelihood of being fed breastmilk at hospital discharge.

Table 2. Pregnancy risk factors, birth outcomes, and infant outcomes of primary refugees to MN compared to general MN birthing population

Birth Outcomes *		Number Observed among Refugee Women	Number Expected†	SRR‡	95% CI§	
Pregnancy Risk Factors *, N=615	Received prenatal care	611	594	1.03	0.95-1.11	
	Pre-pregnancy diabetes	0	9	n/a	n/a	
	Gestational diabetes	31	59	0.53	0.36-0.75	
	Pregnancy anemia	139	95	1.46	1.23-1.73	
	Pre-pregnancy hypertension	1	9	0.11	<0.01-0.60	
	Gestation hypertension	25	41	0.61	0.40-0.90	
	Previous preterm birth	23	37	0.62	0.39-0.93	
	Previous poor birth outcome	20	20	1.02	0.62-1.57	
	Previous cesarean delivery	64	102	0.63	0.48-0.80	
	Smoked cigarettes before or during pregnancy	3	69	0.04	<0.01-0.13	
Birth Outcomes* N=615	Cesarean, N=103	Trial of labor	52	36	1.43	1.07-1.88
	Vaginal, N=512	Epidural or spinal anesthesia	146	233	0.63	0.53-0.74
	All, N=615	Induction of labor	124	141	0.88	0.73-1.05
		No maternal morbidities	581	573	1.01	0.93-1.10
	Nulliparous, N=107	Vaginal delivery	81	78	1.04	0.83-1.29
		Cesarean delivery	26	29	0.89	0.58-1.31
	Multiparous, N=505	All vaginal deliveries	428	383	1.12	1.01-1.23
		VBAC	15	21	0.71	0.40-1.17
		Cesarean delivery	77	122	0.63	0.50-0.79
Neonatal Outcomes*, N=615	Given hepatitis B vaccine	524	499	1.05	0.96-1.14	
	Given hepatitis B immune globulin¶	31	11	2.72	1.85-3.87	
	Breastmilk feeding at discharge	559	489	1.14	1.05-1.24	
	Preterm birth (<37 weeks gestation)	29	57	0.51	0.34-0.73	
	Low birth weight	27	50	0.54	0.36-0.79	
	NICU admission	31	54	0.58	0.39-0.82	
	No abnormal conditions of the newborn¶	532	502	1.06	0.97-1.15	

* Some adverse outcomes and risk factors were analyzed but omitted from this table due to lack of statistical significance and low frequency of observation. Statistically significant results are highlighted in green.
 † Based on MN birth record data for singleton deliveries from 2012-2024.
 ‡ Adjusted for age (5-year age groups), education (<HS degree, HS degree+), race (White, Non-White), payment status (Medicaid, Other) using indirect standardization. SRR represents the ratio of observed to expected events based on statewide rates for singleton deliveries in MN from 2012-2024.
 § Calculated using Poisson Exact Method.
 ¶ Hepatitis B immune globulin receipt was used as a proxy for mother's hepatitis B infection status.
 # Defined as the absence of any severe clinical complications recorded on the Minnesota birth certificate at delivery.

Discussion

Population:

- This study definitively analyzes data from individuals known to be recently arrived refugees - data that is thus unlikely to be confounded by:
 - Prolonged time in the U.S. prior to delivery.
 - Differences among the population in structural supports: In addition to Medicaid eligibility and at least 90 days of case management support upon arrival, refugee women included in this analysis were eligible for wraparound services for the duration of their pregnancy by virtue of their refugee status.

Pregnancy Risk Factors:

- Our data newly identified lower rates of hypertensive disorders of pregnancy, pre-pregnancy diabetes, and gestational diabetes among refugees.

Birth Outcomes:

- By stratifying delivery method by parity, we revealed a key distinction masked by aggregated data: Multiparous refugees had higher vaginal delivery rates than all Minnesotans (likely driven by lower rates of prior cesarean) while nulliparous refugees did not see a lower rate of cesarean deliveries.

Neonatal Outcomes:

- Infants born to refugees had better neonatal outcomes than their MN counterparts. This may be related to the lower rates of maternal comorbidities and nearly nonexistent incidence of smoking prior to or during pregnancy.

Overall, our analysis demonstrated refugees experienced generally favorable maternal and neonatal outcomes, with lower rates of several pregnancy risks and better birth outcomes than the statewide population.

Limitations

- Analysis only included primary refugees in MN who gave birth in MN.
- Infrequent occurrences of certain rare pregnancy and birth outcomes limited the statistical power to detect differences between refugees and the general MN population.
- Various social and cultural factors, such as community support, cultural beliefs and practices, and the effects of employment and parental leave availability, have not been adjusted for and might have affected pregnancy and birth outcomes.

Acknowledgments:

The Minnesota Center for Excellence in Newcomer Health is supported by 1NU50CK000563 from the U.S. Centers for Disease Control and Prevention.