One Size Does Not Fit All: Differences in Newborn Weight Among Mothers of Philippine and Other East Asian Origin

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Abstract

Objective: To determine the likelihood that infants born to Filipina, other East Asian, and Canadian-born women may be misclassified as small for gestational age when using conventional Canadian birth weight curves rather than those specific to their world region.

Methods: We conducted a population-based study of 548 418 singleton live births in Ontario between 2002 and 2007. Smoothed birth weight percentile curves were generated for males and females born to women from Canada, the Philippines, and the rest of East Asia/Pacific. We determined the likelihood of misclassifying an infant as small for gestational age (SGA < 10th percentile weight) or large for gestational age (LGA ≥ 90th percentile weight) on a Canadian-born birth weight curve vs. a curve specific to the other two world regions.

Results: For gestation-specific 10th and 50th percentiles, term infants born to women from the Philippines often had significantly lower birth weights than infants of Canadian-born mothers. Controlling for maternal age and parity, approximately 88 per 1000 male newborns (95% CI 82 to 95) and 72 per 1000 female newborns (95% CI 54 to 60) of mothers from the Philippines were at risk of being misclassified as SGA. LGA would be missed in approximately 54 per 1000 male newborns (95% CI 49 to 59) and 49 per 1000 female newborns (95% CI 44 to 54) of Filipina mothers. Misclassification of both SGA and LGA was more pronounced among infants of Filipina mothers than of mothers from other East Asian origin.

Conclusions: Infants of mothers born in the Philippines weigh significantly less than those of Canadian-born women or mothers emigrating from other East Asian countries. Those who use birth weight curves should consider these differences.

Key Words: Birth weight curves, immigrant, large for gestational age, Philippines, small for gestational age

Competing Interests: None declared.

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Résumé

Objectif : Déterminer la probabilité que les enfants issus de femmes nées aux Philippines, dans d'autres pays de l'Asie orientale et au Canada puissent être classés par erreur comme présentant une hypotrophie fœtale lorsque l'on utilise les courbes de poids de naissance canadiennes conventionnelles, plutôt que les courbes propres à la région de naissance maternelle.

Méthodes : Nous avons mené une étude en population générale portant sur 548 418 naissances vivantes à la suite de grossesses monofœtales en Ontario, entre 2002 et 2007. Des courbes lissées de percentile de poids de naissance ont été générées pour les enfants de sexe masculin et de sexe féminin issus de femmes du Canada, des Philippines et du reste de la région Asie orientale/Pacifique. Nous avons comparé la probabilité de classer par erreur ces enfants comme présentant une hypotrophie fœtale (hypo. fœtale : poids < 10^{e} percentile) ou une hypertrophie fœtale (hyper. fœtale : poids ≥ 90^{e} percentile), en fonction d'une courbe de poids de naissance adaptée aux enfants nés au Canada, à la probabilité d'une telle erreur en fonction d'une courbe propre aux deux autres régions mondiales.

Résultats : En ce qui concerne le 10^{e} et le 50^{e} percentile propre à la gestation, les enfants nés à terme de femmes provenant des Philippines présentaient souvent des poids de naissance considérablement inférieurs à ceux des enfants issus de mères nées au Canada. À la suite de la neutralisation de l'effet de l'âge maternel et de la parité, près de 88 nouveau-nés sur 1 000 (IC à 95 %, 82 - 95) et de 72 nouveau-nées sur 1 000 (IC à 95 %, 54 - 60) issus de mères provenant des Philippines étaient exposés à un risque d'être classés par erreur comme présentant une

hypotrophie fœtale. L'hypertrophie fœtale passerait inaperçue chez environ 54 nouveau-nés sur 1 000 (IC à 95 %, 49 - 59) et chez 49 nouveau-nées sur 1 000 (IC à 95 %, 44 - 54) issus de mères provenant des Philippines. La classification par erreur des nouveau-nés (tous sexes confondus) comme présentant une hypotrophie fœtale ou une hypertrophie fœtale était plus prononcée dans le cas des enfants issus de mères provenant des Philippines que dans celui des enfants issus de mères provenant d'autres pays de l'Asie orientale.

Conclusions : Les enfants issus de mères nées aux Philippines présentent un poids considérablement inférieur à celui des enfants issus de mères nées au Canada ou dans d'autres pays de l'Asie orientale. Les intervenants qui font appel aux courbes de poids de naissance devraient prendre ces différences en considération.

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INTRODUCTION

Birth weight curves are used to describe whether an infant is of appropriate weight for gestational age. Those below the 10th percentile are defined as small for gestational age. SGA newborns may be at higher risk of death,[1] short stature, and lower cognitive function.[2–5] Recommendations for infants born SGA include growth surveillance and extended newborn hospital stay.[3,6] Newborns above the 90th percentile weight for gestational age are considered large for gestational age, and are at higher risk of birth-related trauma, need for resuscitation at birth, management of hypoglycemia, and admission to an intensive care unit. Mothers of LGA newborns have a higher mean rate of emergency Caesarean section and a longer mean hospital stay.[7,8]

Large multiethnic populations in North America, the United Kingdom, and other European countries may warrant birth weight percentile curves that better reflect ethnicity-specific influences on fetal growth.[9–11] Infants born to mothers from East Asia are often classified as SGA using birth weight curves developed in the country to which they have emigrated, when by their own ethnicity-specific curves they would not be considered SGA.[9,10] This has significant consequences, since East Asians are the fastest growing immigrant group in Canada and those from the Philippines form the second largest immigrant subgroup.[12]

Recent research has highlighted the importance of focusing the study of East Asians to separate high-risk from low-risk subpopulations, especially considering the diverse populations of various East Asian countries.[13–16] Specifically, research on Filipino child health suggests a higher risk of SGA,[17] prematurity,[18] and stillbirth[19,20] than among other East Asian groups. Filipino children have the highest rates of underweight and short stature status compared with other East Asian and Pacific Island groups.[21] Compared with white and other East Asian adults, Filipino adults have a higher prevalence of diabetes, hypertension, and the metabolic syndrome, which may be related to their lower weight in infancy and early childhood—a reflection of the Barker hypothesis.[22–24]

Recently, we developed new population-based birth weight percentile charts for live born infants according to seven maternal world regions of birth, including East Asia.[10] The present sub-study evaluated the degree to which newborns of mothers of Philippine versus other East Asian ancestry differ in birth weight, as well as in their risk of being misclassified as SGA, or of being missed as LGA, when plotted on conventional Canadian birth weight percentile charts versus world region-specific birth weight percentile charts.

MATERIALS AND METHODS

Our methods have been described previously.[10] In brief, we completed a population-based study of all singleton live births occurring within Ontario between 2002 and 2007. Live births were identified using birth records provided by Canada's Vital Statistics. We removed records with implausible birth weight for gestational age values according to cut-offs developed on the basis of clinical and statistical criteria.[25] A given woman may have contributed more than one set of birth data during the period of study.

We categorized each newborn according to his or her mother's world region of birth, as follows: Philippine-born, born in the rest of East Asia ("other East Asian"), or Canadian-born, which served as the reference.

Smoothed birth weight percentile curves were derived using non-parametric quantile regression methods.[26,27] Curves were fitted using a cubic spline with three degrees of freedom, with knots located at 23, 30, 39, and 40 weeks, and the use of a smoothing algorithm. The position of the knots was identified by stepwise backward regression using the whole dataset, by infant sex, and then applied to each ethnic group separately. There were no differences between males and females in the location of the knots. The 3rd, 10th, 25th, 50th, 75th, 90th, and 97th percentiles were calculated from the smoothed curves.

Quantile regression was also used to obtain sex-specific birth weight differences and 95% confidence intervals between the newborns of Philippine-born versus Canadian-born mothers, as well as other East Asian-born versus Canadian-born mothers. This was done for percentiles 10, 50, and 90, at 28, 32, 36, and 40 weeks' gestation.

Table 1. Characteristics of 548 418 live born infants born between 23 and 41 weeks' gestation and their mothers, according to maternal world region of birth, 2002–2007

	Region of maternal birth (number of deliveries in the study period)		
Characteristic*	Canada (n = 486 599)	Other East Asian country (n = 46 452)	Philippines (n = 15 367)
Maternal			
Age at delivery, years, mean (SD)	29.5 (10.3)	32.2 (14.9)	32.4 (5.6)
Parity, median (IQR)	2 (1 to 2)	1 (1 to 2)	2 (1 to 2)
Marital status			
Married	334 540 (68.8)	39 349 (84.7)	12 476 (81.2)
Unmarried	72 100 (14.8)	3731 (8.0)	1591 (10.3)
Unknown	79 959 (16.4)	3372 (7.3)	1300 (8.5)
Paternal			
Father's world region of birth			
Same as mother	408 620 (84.0)	37 161 (80.0)	10 299 (67.0)
Different from mother	56 978 (11.7)	5176 (11.1)	2854 (18.6)
Unknown	21 001 (4.3)	4115 (8.9)	2214 (14.4)
Newborn			
Female	237 089 (48.7)	22 269 (47.9)	7413 (48.2)
Gestational age at delivery, weeks, mean (SD)	39.0 (1.7)	38.9 (1.6)	38.5 (1.8)
Birth weight, grams, mean (SD)	3461 (552)	3300 (477)	3218 (526)

*All data are presented as a number (%) unless otherwise indicated.

IQR: interquartile range; SD: standard deviation.

We also graphed the 50th percentile birth weights of male and female newborns of Canadian-born versus Philippine-born mothers, Canadian-born versus other East Asian-born mothers, and other East Asian-born versus Philippine-born mothers. We restricted this analysis to births from 31 weeks' gestation onward, to avoid potentially unstable estimates due to very small sample sizes.

Using the smoothed curve data, we determined the number and rate of newborns from each of three maternal world regions of origin who were above the 10th percentile SGA thresholds within their own region-specific birth weight charts, but who were, at the same time, below the 10th percentile sex-specific weight cut-points for infants of mothers born in Canada. For LGA, a similar approach was used to identify those at or above the 90th percentile weight on their ethnicity-specific curve, but below the 90th percentile on the curve for infants of mothers born in Canada. Logistic regression analysis was used to generate crude and adjusted odds ratios and 95% CIs. Odds ratios were adjusted for maternal age (< 20, 20 to 24, 25 to 29, 30 to 34, 35 to 39, ≥ 40 years) and parity (1, 2, 3, etc.) in the model, a priori.

Permission to conduct the study was obtained from the Research Ethics Board of St. Michael's Hospital, Toronto, Ontario.

RESULTS

Of the 772 297 singleton live births documented between the years 2002 and 2007, 5609 (0.73%) were excluded for one or more of the following reasons: missing infant sex (n = 2), missing or invalid birth weight (n = 593), implausible birth weight for gestational age (n = 748), missing gestational age (n = 609), extreme gestational age (< 23 weeks or > 41 weeks) (n = 4028), or unknown maternal country of birth (n = 842). Of the remaining 766 688 live-born infants, 15 367 had a mother originating from the Philippines, 46 452 from other East Asian countries, and 486 599 from Canada (Table 1).

Approximately 94% of infants were born at between 37 and 41 weeks' gestation (online eAppendix 1). The overall mean gestational age and weight at birth varied among the groups (Table 1).

The percentile values and smoothed birth weight percentile charts according to maternal world region of birth are presented in online eAppendices 1a to 1c and 2a to 2c, respectively. Among women from the Philippines, there were fewer than 10 newborns with a gestational age under 29 weeks.

Relative to term infants of Canadian-born mothers, significant differences were observed in newborn weight

at the 10th (Figure 1, Panel A), 50th (Figure 1, Panel B), and 90th (Figure 1, Panel C) percentiles for infants born to mothers from the Philippines or other East Asian countries. For males born to a Filipina mother at 40 weeks' gestation, the weight difference at the 10th percentile was 191 g (95% CI 156 g to 226 g), which was more pronounced than that between males of other East Asian versus Canadian-born mothers (116 g, 95% CI 100 g to 132 g) (Figure 1, Panel A). Similar weight differences were seen for female newborns (Figure 1, Panel A). At the 50th percentile weight, differences in weight were more pronounced for term infants of Filipina mothers (Figure 1, Panel B).

Among infants born after 31 weeks' gestation (for whom we had sufficient numbers to make comparisons) we plotted the 50th percentile birth weight differences between each of the three maternal origin groups (Figure 2). For Canadian-born versus other East Asian male infants, the difference increased in a linear manner, from 15 g at 32 weeks' gestation to 170 g at 41 weeks' gestation (Figure 2, Panel A). For females, the pattern was similar (Figure 2, Panel B). The weight differential across gestational weeks between male and female newborns of Filipina versus Canadian-born or other East Asian-born mothers was less linearly defined, but was certainly apparent at term (Figure 2).

After controlling for maternal age and parity, other East Asian male infants above the 10th percentile weight on their own world region specific curves were 1.75 times (95% CI 1.68 to 1.81) more likely to be misclassified as SGA using curves for male infants of Canadian-born women (Table 2). Using the same curves, Filipino male infants were 2.18 times (95% CI 2.06 to 2.32) more likely to be misclassified as SGA. Hence, approximately 57 per 1000 (95% CI 54 to 60) other East Asian male newborns and 88 per 1000 (95% CI 82 to 95) Filipino male newborns were potentially misclassified as SGA (Table 2). For female newborns, the numbers were 51 per 1000 (95% CI 48 to 54) and 72 per 1000 (95% CI 66 to 78), respectively (Table 2).

Approximately 60 per 1000 other East Asian male and female newborns would be missed as LGA using Canadian-born curves rather than those for mothers of other East Asian origin (Table 3). Similarly 54 per 1000 male infants and 49 per 1000 female infants of Filipina mothers would be missed as LGA when plotted on a birth weight curve for infants of Canadian-born mothers.

DISCUSSION

We generated contemporary birth weight percentile curves for liveborn singleton infants of Philippine-born and other East Asian-born mothers. Newborns of immigrant mothers from the Philippines weighed significantly less near and at term than newborns of Canadian-born women, and these mothers tended to have smaller babies than other East Asian women. Approximately 1 in 10 infants of Philippine origin were at risk of being misclassified as SGA when using a Canadian-born birth weight curve. Moreover, a significant number of LGA infants of Filipina and other East Asian mothers are missed when plotted on a curve for infants of Canadian-born mothers.

Our study has a number of strengths and weaknesses. It represents 99%[10,28] of singleton live births to Philippine-born and other East Asian-born women who gave birth in Ontario over a six-year period. The findings expand on our previous work[10] and collectively represent a potential improvement over existing widely used curves.[29] In addition, our study is the first to disaggregate "East Asians" and to evaluate the rapidly growing subgroup of Philippine newborns.[12] Changes in birth weight trends for singleton newborns, especially in large, developed countries with high immigration rates such as Canada and the United States, necessitate a revision of data to define accurate birth weight standards.[30]

We did not distinguish the ethnic composition of Canadian-born women, including those with the same ancestry as immigrant women classified as Philippine-born and other East Asian-born—a distinction that may have attenuated our risk estimates. In addition, we did not account for the effect of maternal nutrition, smoking, diabetes mellitus or hypertension, maternal or paternal body size, or duration of residence in Canada.

We must also acknowledge that, despite our capture of nearly all live births, the small sample sizes for Philippine infants born before 32 weeks' gestation create relatively unstable estimates in the percentile curves we have generated. Thus, caution must be used in interpreting the data for Philippine infants born very preterm.

While some studies of customized birth weight percentiles have evaluated the influence of maternal characteristics on fetal growth, including maternal height, pre-pregnancy weight, parity, and ethnicity,[31–36] these studies were limited by their use of homogenous population cohorts[32] or exclusion of the ethnically diverse populations found in Canada.[33–36] In addition, most prior studies assumed a similar fetal growth pattern among ethnic groups.[37]

Some studies have described using conditional fetal growth percentiles, which are percentiles calculated taking into account (conditional on) the weight of a fetus earlier in pregnancy.[38,39] However, they found that this measure does

Figure 1A. Difference in birth weight for infants of mothers from the Philippines and other parts of East Asia compared to infants of Canadian-born women. Data represent the 10th (Panel A), 50th (Panel B), and 90th (Panel C) percentiles for newborn weight at 28, 32, 36, and 40 weeks' gestation, males and females. Values in parentheses represent the newborn weight for maternal region of birth, percentile, and gestational age.

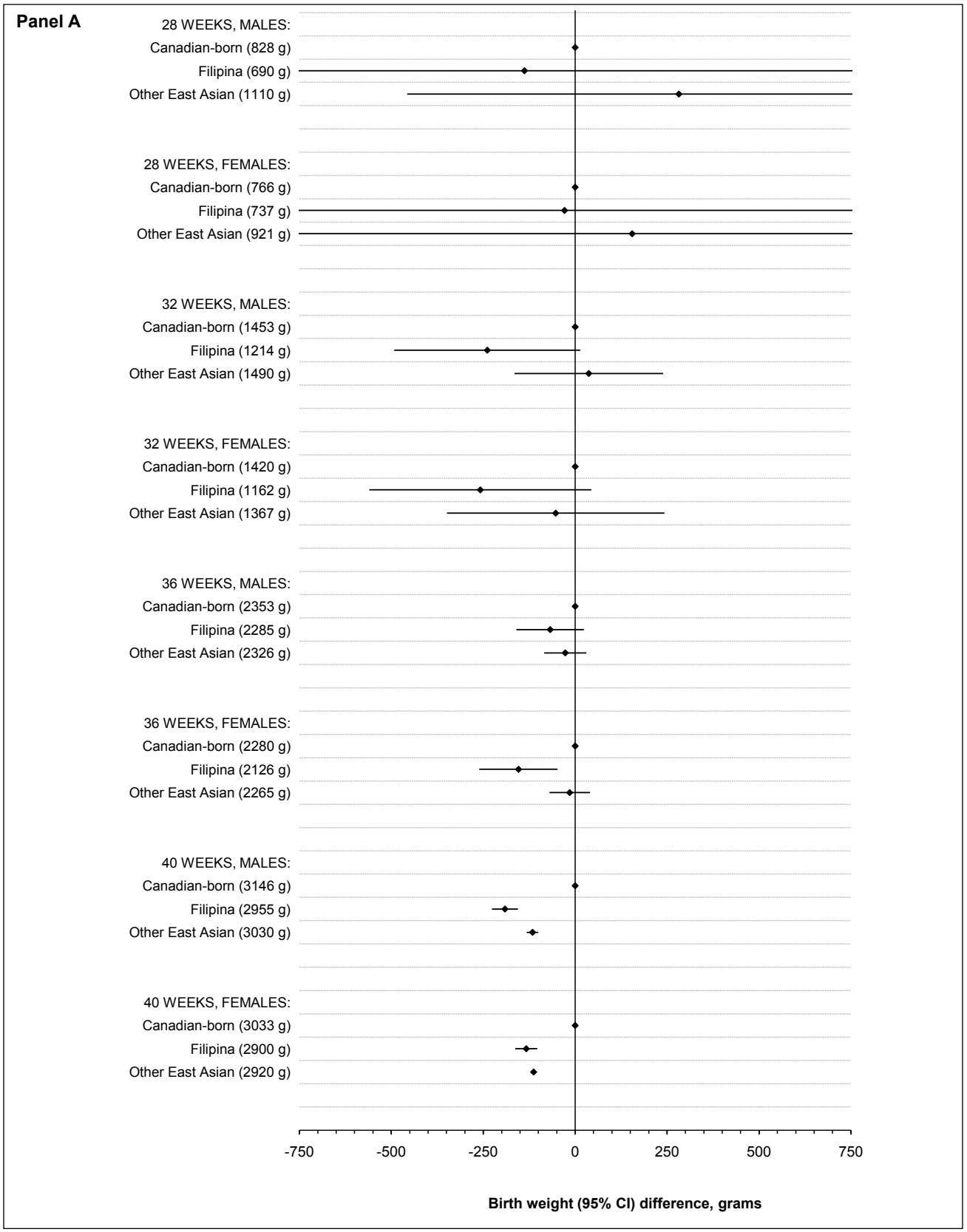


Figure 1B. Difference in birth weight for infants of mothers from the Philippines and other parts of East Asia compared to infants of Canadian-born women. Data represent the 10th (Panel A), 50th (Panel B), and 90th (Panel C) percentiles for newborn weight at 28, 32, 36, and 40 weeks' gestation, males and females. Values in parentheses represent the newborn weight for maternal region of birth, percentile, and gestational age.

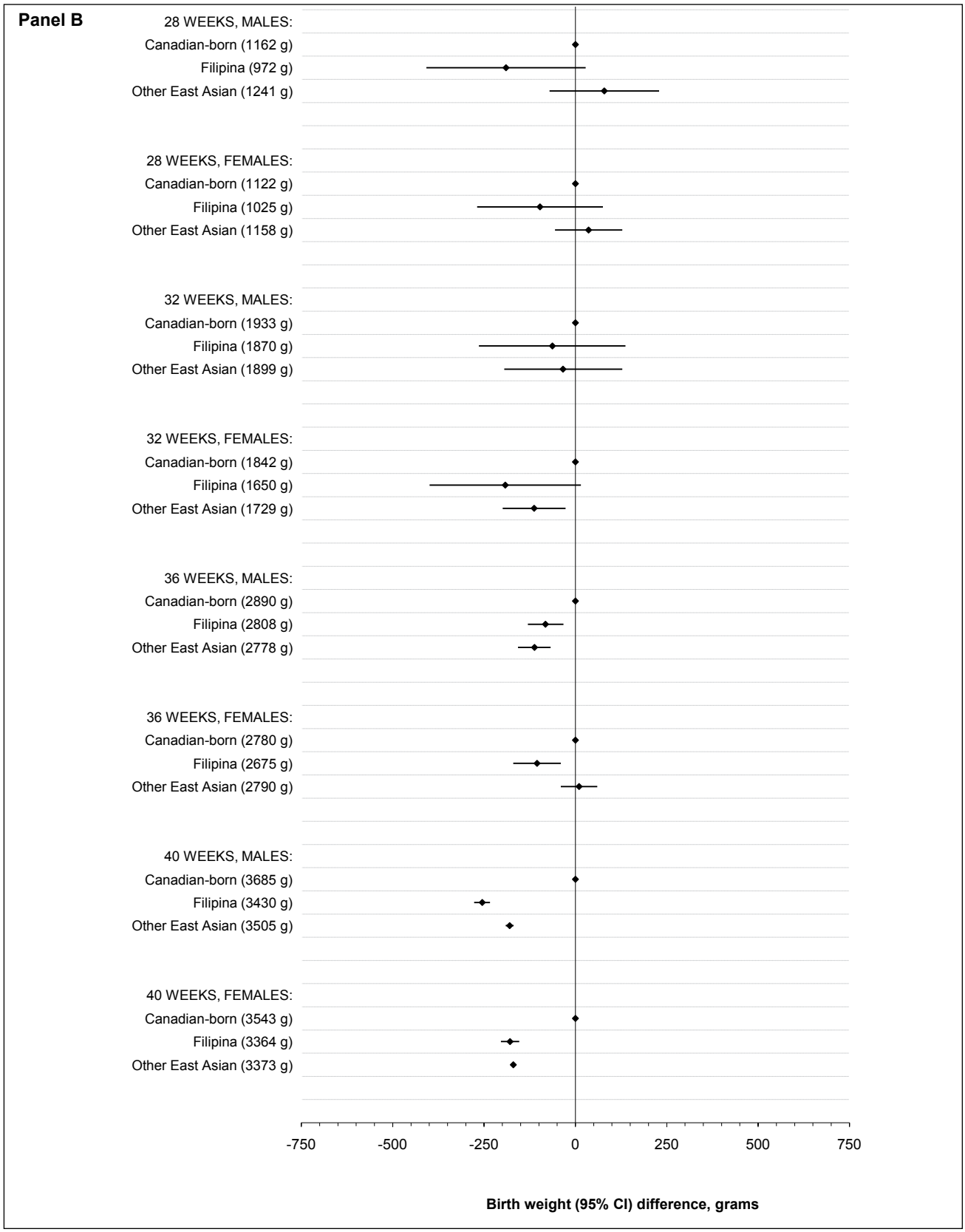


Figure 1C. Difference in birth weight for infants of mothers from the Philippines and other parts of East Asia compared to infants of Canadian-born women. Data represent the 10th (Panel A), 50th (Panel B), and 90th (Panel C) percentiles for newborn weight at 28, 32, 36, and 40 weeks' gestation, males and females. Values in parentheses represent the newborn weight for maternal region of birth, percentile, and gestational age.

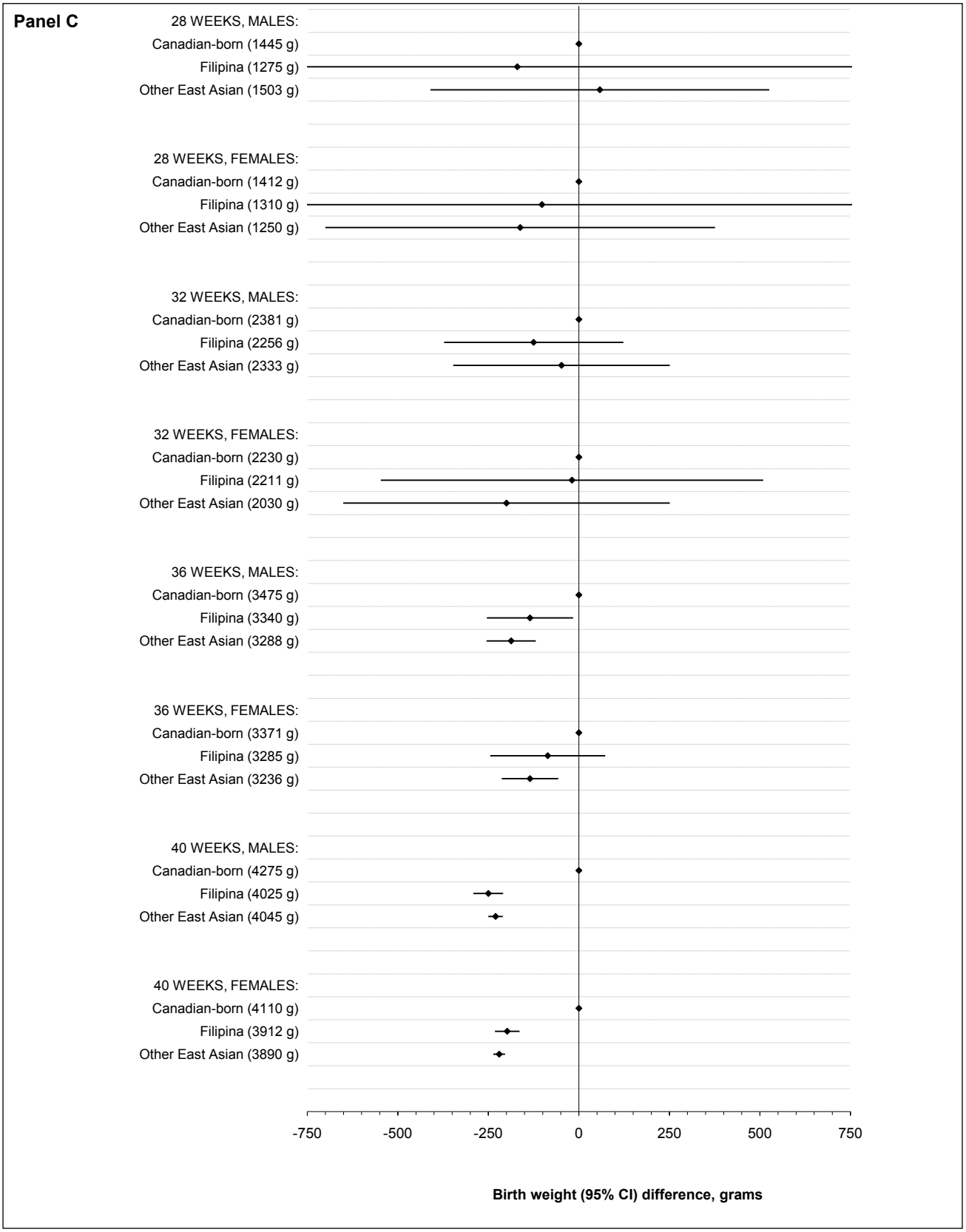
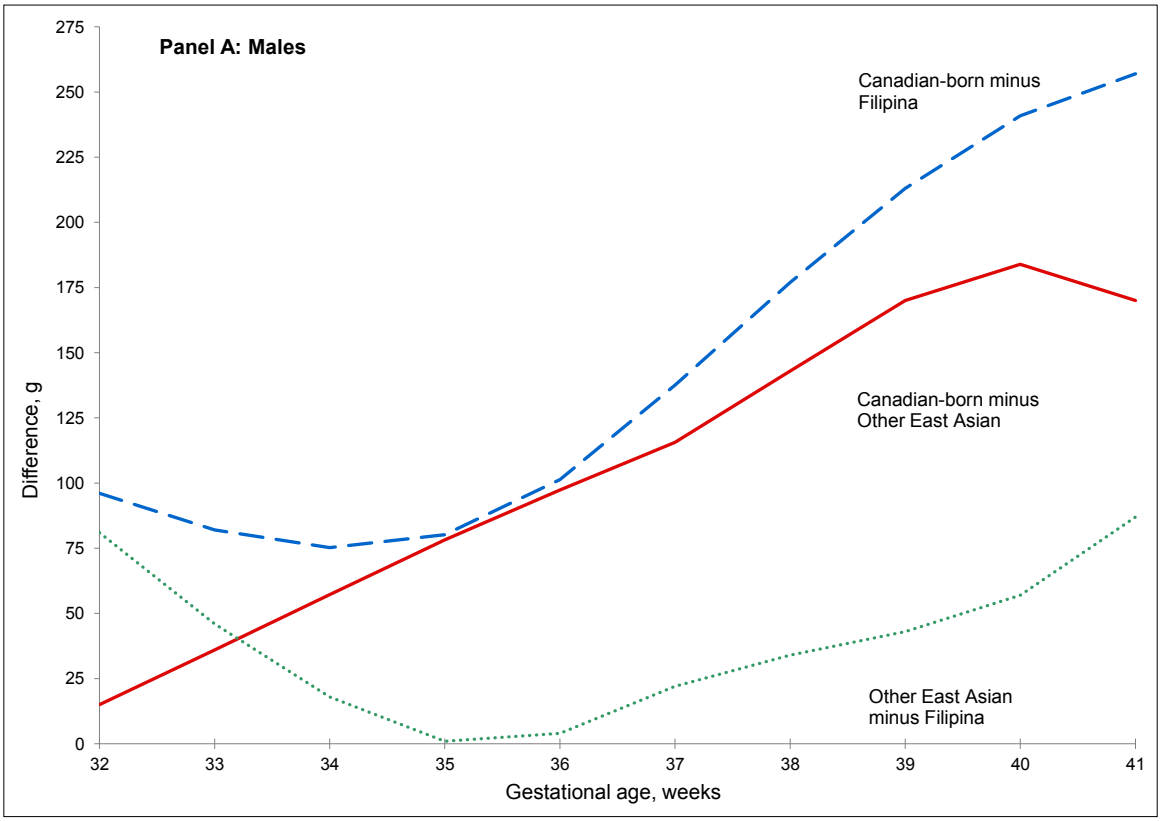


Figure 2. Difference in 50th percentile birth weight for male (Panel A) and female (Panel B) infants comparing those of Canadian-born versus Philippine-born mothers (top dashed line), Canadian-born versus other East Asian-born mothers (middle solid line), and other East Asian-born versus Philippine-born mothers (lower dotted line). Data are limited to births between 32 and 41 weeks' gestation to avoid unstable estimates related to small sample sizes before 32 weeks' gestation.



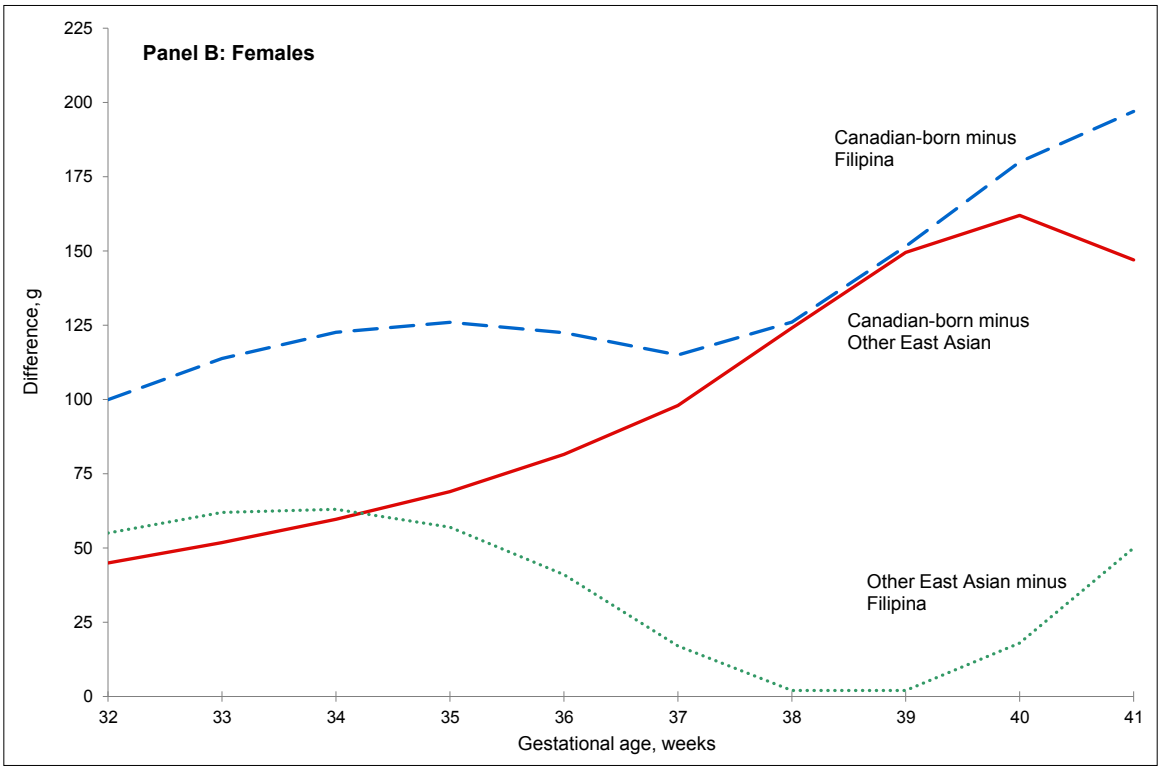


Table 2. Risk that a newborn infant is classified as small for gestational age using smoothed weight centiles curve for infants of Canadian-born mothers rather than a curve specific to the mother's world region of origin

		Maternal world region of birth		
Newborn	Measure	Canada (n = 486 599)	Other East Asian country (n = 46 452)	Philippines (n = 15 367)
Males	n (%)	24 715 (9.9)	3767 (15.6)	1486 (18.7)
	Crude OR (95% CI)	1.00 (ref)	1.68 (1.62 to 1.74)	2.09 (1.97 to 2.21)
	aOR (95% CI)*	1.00 (ref)	1.75 (1.68 to 1.81)	2.18 (2.06 to 2.32)
	Newborns potentially misclassified as SGA per 1000 live births, n (95% CI)	n/a	57 (54 to 60)	88 (82 to 95)
Females	n (%)	23 559 (9.9)	3333 (15.0)	1261 (17.0)
	Crude OR (95% CI)	1.00 (ref)	1.60 (1.53 to 1.66)	1.86 (1.75 to 1.98)
	aOR (95% CI)*	1.00 (ref)	1.65 (1.58 to 1.72)	1.92 (1.80 to 2.05)
	Newborns potentially misclassified as SGA per 1000 live births, n (95% CI)	n/a	51 (48 to 54)	72 (66 to 78)

*Adjusted for maternal age groups (< 20, 20 to 24, 25 to 29, 30 to 34, 35 to 39, 40 + years) and parity (1, 2, 3, etc.)

n/a: not applicable

Table 3. Risk that a newborn infant is not classified as large for gestational age using a smoothed weight centiles curve for infants of Canadian-born mothers rather than a curve specific to the mother's world region of origin

		Maternal world region of birth		
Newborn	Measure	Canada (n = 486 599)	Other East Asian country (n = 46 452)	Philippines (n = 15 367)
Males	n (%)	25 031 (10.0)	977 (4.0)	367 (4.6)
	Crude OR (95% CI)	1.00 (ref)	2.65 (2.48 to 2.83)	2.31 (2.07 to 2.56)
	aOR (95% CI)*	1.00 (ref)	2.66 (2.49 to 2.85)	2.40 (2.16 to 2.67)
	Newborns potentially missed as LGA per 1000 live births, n (95% CI)	N/A	60 (57 to 63)	54 (49 to 59)
Females	n (%)	23 945 (10.1)	914 (4.1)	390 (5.3)
	Crude OR (95% CI)	1.00 (ref)	2.62 (2.45 to 2.81)	2.02 (1.83 to 2.24)
	aOR (95% CI)*	1.00 (ref)	2.65 (2.47 to 2.83)	2.11 (1.90 to 2.34)
	Newborns potentially missed as LGA per 1000 live births, n (95% CI)	N/A	60 (57 to 63)	49 (44 to 54)

*Adjusted for maternal age groups (<20, 20 to 24, 25 to 29, 30 to 34, 35 to 39, ≥ 40 years) and parity (1, 2, 3, etc.)

N/A: not applicable

not improve the detection of adverse perinatal outcomes compared with conventional weight-for-gestational-age charts. The measure of fetal growth restriction is not synonymous with small for gestational age.[40] Moreover fetal weight at each gestational age may be variable among newborns of mothers from Canada, East Asia, and the Philippines. Our analysis revealed that, among women from the Philippines, 50th percentile birth weight differences showed a linear increase in weight differences after 35 weeks' gestation compared with Canadian-born mothers, increasing by approximately 30 g per week in males and approximately 21 g per week in females. Compared with other East Asians, infants born to women from the Philippines were progressively smaller after 35 weeks' gestation. Therefore, birth weight discrepancies may worsen with gestational age for infants of mothers from the Philippines compared with their Canadian and other East Asian counterparts.

Critics of customized birth weight curves also argue that there is incremental value in the identification of SGA related to IUGR versus the otherwise healthy baby born

SGA.[38,41] However, these studies were conducted outside Ontario, did not distinguish East Asians from South Asians, had small sample sizes of Asians, and focused primarily on maternal characteristics other than ethnicity. Despite the ongoing debate, extensive research has shown that SGA—defined by customized growth potential—may aid in identifying more pregnancies at risk for adverse outcome[42] and perinatal death.[43]

Mikolajczyk and colleagues recently showed that ethnicity improves the classification of SGA.[44] The OR for adverse newborn outcomes in association with SGA versus non-SGA using a conventional fetal-weight reference was 1.59 (95% CI 1.53 to 1.66), compared with an OR of 2.87 (95% CI 2.73 to 3.01) using a country-specific reference, and an OR of 2.84 (95% CI 2.71 to 2.99) for the fully individualized reference.[44] The same study showed that addition of other maternal parameters provided little further improvement over the ethnicity-adjusted reference.

Recent studies have shown that the prevalence of gestational diabetes mellitus is higher in East Asian women than in white women.[22,45] Gestational diabetes mellitus tends to cause fetal macrosomia, suggesting that the rate of LGA should be higher in infants of Philippine-born and other East Asian-born women. However, the opposite was shown to be true, consistent with data showing that women from the Philippines have higher rates of preterm delivery and low infant birth weight than various ethnic minorities in the United States.[46] Furthermore, there is emerging evidence of a higher risk of metabolic syndrome, diabetes, and hypertension in Philippine adults than among other East Asian or white women, despite their lack of phenotypic obesity.[47–49]

While maternal chronic hypertension or preeclampsia may contribute to lower newborn birth weight, we were unable to measure this using our dataset. We previously showed that Filipina women have higher rates of chronic hypertension than women from other East Asian countries.[49] In another study, we found that women from South Asia and East Asia experience nearly the same rates of serious preeclampsia as women from industrialized nations,[50] but in the present study they consistently had infants of lower birth weight. Thus, it remains to be elucidated whether maternal or placental disease contributes to SGA, especially among Filipina mothers.

Discrepancies in newborn weights of mothers from the Philippines and other parts of East Asia may convey information beyond physiological differences in pregnancy and genetic predisposition. Savitz and colleagues measured the risk of gestational diabetes mellitus among various ethnic groups and found that "Asians" were at higher risk than other groups, but with substantial within-group variation.[51] Controlling for maternal birth weight or BMI may clarify the role of epigenetic influences and intergenerational differences in birth weight before and after immigration, which would also permit evaluation of healthy migrant and acculturation effects. Similarly, investigations of the influence of socioeconomic status, baseline health in the country of origin, and the time interval between immigration and obstetrical delivery might lead to explanations beyond ethnic status of some of the variation in newborn weights.

It is important to distinguish between neonatal morbidity and mortality among infants miscategorized as SGA using conventional birth weight curves and infants who are truly SGA according to their world region-specific curves. For example in Canada, Chinese infants have lower than average perinatal mortality rates, despite having higher rates of SGA.[11] In the United States, Filipina mothers have rates of infant, neonatal, and postnatal mortality that are similar to those of Caucasian women,[52] despite having infants of lower birth weight.[29] Hence, a lower birth weight at a given gestational age may not necessarily reflect a pathological process.

Disaggregating East Asian subgroups may be warranted in rapidly growing, vulnerable groups, such as those who immigrate to Western nations. There is growing research about disparities in health outcomes among East Asians,[13–16] which may be reflected in the intrauterine environment and final birth weight.[17–20] Considering the latter, and the apparent heterogeneity of East Asians, prenatal and neonatal care providers might soon consider using ethnicity-specific percentile curves,[11,44] including those described here. The eventual application of these curves might help to minimize the misclassification of healthy newborns as SGA and improve recognition of those who are truly LGA. This would allow more efficient use of limited health resources, for example by reducing unnecessary monitoring for hypoglycemia among infants who are not truly LGA.[53,54] However, the use of Philippine-specific curves requires further study to elucidate the true magnitude of birth weight differences between Philippine and other East Asian newborns. While there appears to be, at the very least, a noteworthy difference between the two groups and their Canadian-born counterparts, the potential pathological origins of such differences requires exploration. Considering the prevalence and incidence of metabolic diseases such as gestational diabetes mellitus and hypertension in these high-risk groups,[55–57] it is also prudent to recognize and address their distinct health care needs.

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