Perinatal Outcome among Non-Residents in Israel

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Key words: medical insurance, non-residents, perinatal outcome, pregnancy surveillance

Abstract

Background: Foreign workers in Israel are not covered by the comprehensive medical insurance that all Israelis receive. They have national insurance and injury-related coverage, which does not include routine pregnancy follow-up

Objectives: To compare perinatal outcome between partially insured non-resident migrants in Israel and comprehensively insured Israeli women.

Methods: Parameters of perinatal outcome were compared between 16,012 Israeli and 721 foreign women living in Israel. Outcome measures included birth weight, distribution of gestational age at delivery, neonatal complications, cesarean section, neonatal intensive care unit admission, intrauterine fetal death rates, and duration of post-partum hospitalization.

Results: Deliveries prior to 28 weeks gestation occurred more frequently among non-residents (1.3% vs. 0.6%, $P < 0.001$). Gestational diabetes and preeclamptic toxemia were significantly more prevalent among non-residents (3.2% vs. 1.9%, $P < 0.05$ and 4.9% vs. 3.1%, $P < 0.05$, respectively). The cesarean rates were 18% and 35% for residents and non-residents, respectively ($P < 0.001$), and the post-cesarean recovery period was longer among non-residents (4.8 vs. 3.6 days, $P < 0.05$). The mean birth weight was similar in the two groups (3,214 vs. 3,231 g), although macrosomia (>4,000 g) was more prevalent among non-residents, who also had higher rates of NICU admission ((9.6% vs. 8%, $P < 0.05$) and intrauterine fetal death (6.6/1,000 vs. 3.7/1,000, $P < 0.05$).

Conclusions: Non-resident parturients in Israel are more susceptible to an adverse perinatal outcome than their Israeli counterparts. We suggest that government subsidization of non-residents' health expenditures would reduce the differences in perinatal outcome between these two groups.

IMAJ 2005;7:315–319

Israeli residents are provided with comprehensive healthcare coverage, which is partially supported by government funding. Health services are available to all Israeli citizens but not to non-residents. The rapidly expanding community of foreign laborers in Israel is very diverse, with individuals from Europe (mostly Eastern Europe countries), Africa (Kenya, Nigeria, Ghana) and Asia (Thailand, The Philippines, China). The total number of migrants in Israel is estimated at around 300,000 [1,2], and the vast majority (70%) lacks work permits and is not medically insured. Moreover, migrant workers with work permits have only national insurance and injury-related coverage, which does not include routine pregnancy follow-up. Cokkinides [3] studied the relationship between healthcare insurance eligibility and enrollment procedures and adequacy of prenatal care in the United States and concluded that programmatic efforts and policies should emphasize further improvement in healthcare access and delivery to disadvantaged women. Ellencweig et al. [4] reported that the type of insurance was the major determinant of frequency of antenatal visits among pregnant women in Jerusalem. Private medical insurance is available, but since it is expensive many non-residents are not insured.

Routine antenatal follow-up consists of a number of checkup visits, screening tests, genetic counseling (when indicated), Down syndrome detection tests, and ultrasound scans. Previous studies have shown that early detection of high risk pregnancies followed by routine antenatal checkups may prevent complications, and that perinatal mortality was inversely proportional to the number of prenatal contacts [5]. Conversely, undetected and uncontrolled medical conditions may adversely affect perinatal outcome [6,7]. We investigated the differences in parameters of perinatal outcome between Israeli women and non-resident migrants in Israel.

Patients and Methods

This descriptive-comparative study included 16,733 consecutive deliveries (17,096 newborns) at Lis Maternity Hospital (Tel Aviv, Israel) between January 2001 and December 2002. The parturients were divided into 16,012 Israeli residents and 721 non-residents. We excluded 15 non-residents (14 diplomats and one research student) who had full coverage of health expenditures.

Gestational age was calculated either by a first-trimester crown-rump length measurement when available or by the first day of the last menstrual period correlated with the earliest available biometric data. If no information on the last menstrual period or biometry was available, we used current biometry as a rough approximate for gestational age (this applied to 16 cases overall, 5 of them in the non-resident group).

Deliveries $\geqslant$ 37 weeks that were induced for fetal or maternal indication (e.g., intrauterine growth restriction, severe preeclamsia, etc.) were designated medically induced preterm deliveries. Gestational diabetes was screened by a 50 g glucose challenge test and diagnosed by a 100 g oral glucose tolerance test. Large- and small-for-gestational age newborns were defined (according to Alexander's growth charts) [8] by the 90th and 10th percentile for birth weight, respectively. The cutoff for macrosomia was set at 4,000 g. The same reference values for fetal growth were used for all women due to the heterogeneity of both groups, which precluded matching different growth curves for each subpopulation.

Preeclampsia was defined by a blood pressure reading of

NICU = neonatal intensive care unit

⩾ 140/90 concurrent with proteinuria of ⩾ 300 mg per 24 hours or consistently more than 30 mg/dl in random urine samples. Stillbirth was defined as birth of a non-living fetus of ⩾ 24 weeks gestation or weighing ⩾ 500 g.

Data on the incidence of meconium aspiration syndrome, necrotizing enterocolitis and intraventricular hemorrhage were retrieved from the Neonatal Intensive Care Unit archives. We reviewed the computerized obstetric records to compare the following parameters of perinatal outcome between non-residents and Israeli women: mode of delivery, distribution of birth weights and gestational age at delivery, NICU admission rate, neonatal complication rate (meconium aspiration syndrome, necrotizing enterocolitis, intraventricular hemorrhage), stillbirths, and the length of maternal postoperative hospitalization.

All statistics were done using SPSS for Windows version 11 (SPSS Inc., Chicago, USA). A *P* value of <0.05 on chi-square test was considered statistically significant. Results are given as mean ± standard deviation unless specified otherwise.

Results

According to our computerized files, there were 16,733 deliveries at Lis Maternity Hospital during the period of the study. These comprised 16,374 singletons, 354 pairs of twins (2.1% of deliveries) and 5 sets of triplets (0.03%), yielding a total of 17,097 newborns. Our study population consisted of 16,012 Israeli women with a mean age of 26.6 ± 2.5 years and 721 non-residents with a similar mean age (26.4 ± 2.3 years). The prevalence of multifetal gestation was significantly higher among the Israeli women than among the non-residents (2.1% and 1.4% for twins respectively, $P < 0.05$ and 0.03% and 0% triplets respectively, $P < 0.05$). Pregestational body mass index did not differ significantly (21.6 ± 1.6 and 22.1 ± 2.1, $P = 0.33$) between the two groups, nor did the percentage of primiparous women (54% vs. 55%). Parity was higher among the Israeli than among the non-residents (1.8 ± 0.9 vs. 1.3 ± 0.5, $P < 0.05$). The diverse ethnic distribution of the non-residents was: 258 Africans (36%), 340 Asians (47%), 80 East Europeans (11%) and 43 South Americans (6%).

Table 1 presents the comparative data on various parameters related to delivery and maternal outcome between the two groups. Although the mean gestational age at delivery was similar, there were more spontaneous preterm deliveries ⩽ 28 weeks among non-residents than among Israeli (1.3% vs. 0.6%, $P < 0.001$, respectively) as well as preterm deliveries between 28 and 36 weeks (10.1% vs. 7%, $P < 0.05$, respectively). Interestingly, induced deliveries prior to 37 weeks for maternal or fetal indications were much more prevalent among the Israeli women (4.6% vs. 1.4%, $P < 0.001$), while postdate pregnancies (>294 days) were more frequently encountered among the non-resident women (1.4% vs. 0.3%, $P < 0.001$).

More Israelis than non-resident women underwent antenatal screening tests such as nuchal translucency measurement and glucose challenge test. There were no such group differences for sonographic malformation screening.

The true incidence of gestational diabetes among non-residents is unknown since many of them (38%) lacked the results of the screening test (glucose challenge test) or the diagnostic 100 g oral glucose tolerance test. Nevertheless, the information that was available revealed that gestational diabetes was more prevalent among the non-residents who did perform glucose challenge tests compared with the insured Israelis (3.2% vs. 1.9%, $P < 0.01$). Newborns weighing >4,000 g were more prevalent among neonates of foreign women, with most macrosomic infants (94%) having been born to non-diabetic mothers. No cases of intrauterine fetal demise or fetal malformation could be attributed to maternal gestational diabetes, but this complication is very rare and our numbers are too low to draw any conclusions.

Despite the under-detection of milder cases, preeclamsia was more prevalent among the non-residents (4.9% vs. 3.1%, $P < 0.001$). Most preeclamptic pregnancies among the non-residents were first diagnosed near term (30/35, 86%), whereas only 49% of Israeli preeclamptic pregnancies were diagnosed after 37 weeks gestation ($P < 0.001$).

The cesarean section rate was higher among the non-residents (35% vs. 18%, $P <$

Table 1. Parameters related to delivery and maternal outcome

	Residents (n=16012)	Non-residents (n=721)	*P* value
Mean gestational age at delivery (weeks ± SD)	38.3 ± 1.2	38.1 ± 1.9	0.34
Gestational age distribution			
<28 weeks	0.6%	1.3%	<0.001
28–36 weeks	7.0%	10.1%	0.05
Medically indicated preterm deliveries	4.6%	1.4%	<0.001
Term deliveries	91.1%	87.2%	0.10
Postdate pregnancies (>294 days)	0.3%	1.4%	<0.001
Screening test			
Nuchal translucency	64%	11%	<0.001
Triple test	82%	31%	<0.001
Sonographic malformation screening	94.5%	91.8%	0.17
Glucose challenge test	93%	62%	<0.001
Infectious disease screening (HIV, HbsAg, VDRL)	94%	45%	<0.001
Pregnancy complications			
Diabetes	1.9%	3.2%	<0.001
Preeclampsia	3.1%	4.9%	<0.001
Mode of delivery			
Normal vaginal deliveries	76.4%	59.9%	<0.001
Instrumental vaginal deliveries	5.6%	5.1%	0.22
Cesarean rate	18%	35%	<0.001
Distribution of cesareans			
Cesareans indicated due to arrest of labor	24%	52%	<0.001
Percentage of elective cesareans	44%	14%	<0.001
Postoperative hospitalization (days)	3.6 ± 0.4	4.8±0.8	<0.05

Table 2. Parameters of neonatal outcome

	Residents (n=16366 newborns)	Non-residents (n=731 newborns)	*P* value
Singletons	15,663	711	
Twins	688	20	
Triplets	15	0	
Mean birth weight (g)	3,214 ± 201	3,231 ± 321	0.28
Distribution of birth weight			
<1,500 g	1.1%	2.3%	<0.05
1,500–2,500 g	5.3%	7.2%	<0.05
2,500–4,000 g	89.4%	84.5%	0.09
>;4,000 g	4.2%	6.0 %	<0.05
Small for gestational age	8.1%	10.2%	<0.05
Large for gestational age	5.6%	7.2%	<0.001
NICU admission rate	8%	9.6%	<0.05
Meconium aspiration syndrome	0.9%	1.1%	0.24
Necrotizing enterocolitis	0.33%	0.37%	0;6
Intraventricular hemorrhage > grade I	0.28%	0.36%	0.26
Intrauterine fetal death rate	0.37%	0.66%	<0.05
Congenital malformations	0.7%	0.11%	0.19

0.001), with an overall rate of 19%. The indications for the operation were similar but the distribution was different between the two studied groups; arrest of dilatation and descent was much more frequently specified as the main indication for a cesarean in the non-residents group (52%). Arrest of labor was also a leading cause for performing a cesarean section among the Israeli women, but to a much lesser extent (24%, $P < 0.001$). Only 14% of cesareans among the non-residents were elective as compared to 44% among the Israelis ($P < 0.001$).

The mean postpartum maternal stay after a vaginal delivery was 2.2 and 2.3 days for the Israeli and non-resident women, but postoperative hospitalization was significantly longer among the non-residents (4.8 vs. 3.6 days, $P < 0.05$).

Table 2 shows selected parameters of neonatal outcome for the two cohorts. The mean birth weight was similar for both, but the distribution of birth weights revealed major discrepancies between the two cohorts since macrosomic infants as well as low and very low birth weight infants were more prevalent among the non-resident mothers. Among the preeclamptic mothers, there were 24 (3.2%) non-resident SGA infants as compared to 365 (2.2%) Israeli SGA infants ($P < 0.05$).

A common endpoint parameter for many neonatal complications is the NICU admission rate, which was significantly higher for non-resident newborns (9.6% vs. 8%, $P < 0.05$). No differences were noted between the two groups of newborns in the rate of meconium aspiration syndrome, necrotizing enterocolitis, intraventricular hemorrhage, and congenital malformation. In contrast, the incidence of intrauterine fetal death was significantly higher among the non-residents (6.6/1,000 vs. 3.7/1,000, $P < 0.05$).

Discussion

Improved perinatal outcome probably reflects the combination of a multitude of beneficial effects associated with comprehensive prenatal services, including nutritional, psychosocial and health education support [9–11]. Advances in controlling pregnancy-related disorders, such as hypertension and diabetes, and preventing their complications further underline the importance of early detection in minimizing adverse perinatal outcome and maternal morbidity.

There are approximately 300,000 foreign laborers living in Israel (5% of the general population), and most of them have limited antenatal surveillance which is essentially limited to basic laboratory results (blood count and standard ultrasonographic malformation screening). Our two study groups were clearly differentiated by the extent of antenatal surveillance, as demonstrated by the lower rates of nuchal translucency measurements, triple test for Down syndrome screening, gestational diabetes screening, and serologic tests for detrimental infections such as human immunodeficiency virus and hepatitis virus among the non-residents.

Poor antenatal care is reported to be a risk factor for preterm deliveries. We found preterm deliveries (<36 weeks gestation) to be more prevalent among non-residents. Blondel and colleagues [10,11] reported that poor attenders of antenatal visits had odds ratios for preterm delivery in the range of 3.3–5.8. Others [5] also found the absence of antenatal care to be a risk factor for preterm birth. On the other hand, induced deliveries for maternal or fetal complications were more frequently encountered among the Israelis, probably due to the higher rate of detection of pregnancy complications necessitating induction, such as preeclampsia or a reduced amount of amniotic fluid.

Postdate pregnancies, defined as a gestation lasting longer than 294 days, were more prevalent among non-residents, most probably due to the strict follow-up protocol of 280–294 days gestation that was routinely initiated for Israelis and which included the induction of labor when indicated. A prolonged pregnancy is considered high risk and is associated with higher rates of meconium and meconium aspiration, macrosomia, shoulder dystocia, oxytocin induction, and cesarean delivery [12]. Due to the low numbers and the relative rarity of these complications, we could not support postdate pregnancy as a major determinant of perinatal morbidity.

Appropriate antenatal surveillance may facilitate early detection of common gestational complications such as gestational diabetes and hypertensive disorders, and allows preventive measures to be taken. Although screening for these disorders was only partial among non-residents, the prevalence of both was higher among them and, even more noteworthy, detection was typically late, which may be detrimental. Most of the foreign women with preeclampsia were diagnosed near term, probably well after the disease had caused the injurious systemic effects that prompted the women to seek medical consultation in spite of their financial restraints. In contrast, preeclampsia among most of the Israelis was detected during routine checkup visits when the women were still asymptomatic.

SGA = small for gestational age

The cesarean rate among non-residents was twice that of the Israelis. The most frequent indication for a cesarean (52%) among non-residents was arrest of labor, as defined by Friedman's criteria [13] that are based on a statistical analysis of labor progression among white American women. Caldwell and associates [14] classified pelvic anatomy according to its shape and pointed out the importance of ethnicity in the prevalence of the different types. The higher cesarean rate among non-residents (including Asian and African women) may stem from inadequate use of definitions for protracted labor in these populations, leading to unnecessary surgery for a delivery that is progressing normally for that particular parturient. Others explain the increased cesarean rate by paternal effects that lead to larger fetuses [15]. The abundance of emergent operative deliveries as compared to elective cesareans among non-residents may be explained by a lack of antenatal care and, consequently, fewer planned operations for presumptive dystocia (e.g., undiagnosed breech presentation, unpredicted cephalo-pelvic disproportion). Acute complications, such as severe preeclampsia, were also more prevalent among non-residents, adding to the high rate of emergent cesareans.

The length of postoperative hospitalization reflects the increased complication rate in emergent cesareans compared to elective operations, and emphasizes the need to minimize unplanned cesareans by early detection of candidates for operative delivery. In addition, the prolonged hospital stay imposes a substantial financial burden on both the woman and the medical facilities.

Our finding that both macrosomia (>4,000 g) and very low birth weight (<1,500 g) were more prevalent among non-residents is in accordance with previous publications [5,16]. Extreme birth weights may result from inadequate or excessive weight gain due to lack of antenatal nutritional guidance or from uncontrolled maternal disorders such as diabetes, hypertension and chronic disease. There were 35 preeclamptic women in the non-resident group and they had 36 newborns of whom 24 were SGA. These SGA infants constituted 3.2% of the total number of non-resident newborns. In contrast, there were 496 Israeli preeclamptic women with 501 newborns of whom 365 were SGA, comprising 2.2% of the total number of Israeli infants. These differences suggest that the higher prevalence of SGA among non-residents' infants stem partially from a higher prevalence of preeclampsia, which is associated with low birth weight.

Neonatal complications such as meconium aspiration syndrome, necrotizing enterocolitis and intraventricular hemorrhage were not significantly more prevalent in the non-resident neonates, although previous studies reported higher neonatal morbidity with a longer NICU stay and lower Apgar scores for infants of mothers with poor antenatal care [17]. Although prematurity was more prevalent in the neonates of our non-resident group, the numbers are too low to define statistically significant differences in the rate of complications of prematurity.

The NICU admission rate is a parameter that is influenced by a multitude of perinatal outcome indices, including gestational age at delivery, birth weight, maternal medical and nutritional condition, cesarean rate, and intrapartum events. The NICU admission rate was higher among infants born to our non-resident study group as compared to the Israeli group, a finding that concurs with previous studies [18] underlining adequate antenatal care as a major preventive measure against neonatal morbidity. The higher NICU admission rate and the longer length of stay of the non-resident infants in this unit significantly increase the expenditure that is usually covered by hospital resources.

Minimizing perinatal mortality is a fundamental objective of antenatal care. Several studies have shown that perinatal mortality is significantly increased among women with poor antenatal care [16,19]. The intrauterine fetal death rate was higher among our non-residents (6.6/1,000 vs. 3.7/1,000, $P < 0.05$) and this may be explained, to a considerable extent, by poor antenatal care, although there certainly can be other contributory factors, such as socioeconomic status and nutrition.

This study has a few limitations, one of which is the wide heterogeneity of the studied population. The non-resident cohort comprised women from Asia, Africa and Europe, who have different bone structures, dietary habits and birth weight distribution. These factors bear different risk factors and probably different definitions of dystocia, macrosomia and growth restriction. We are also aware of a possible selection bias whereby non-residents with uncomplicated pregnancy prefer to deliver in facilities outside of the Israeli public health sector, whereas non-residents with a complicated gestation are referred to the nearest hospital. In addition, the Israeli and non-resident populations differ not only in the extent of perinatal care, but also in nutrition and socioeconomic status – each of which may influence perinatal outcome [5]. Finally, data on routine pregnancy follow-up are unavailable for many non-residents, thus restricting our ability to comprehensively compare the two cohorts. It is reasonable to assume that the prevalence of various gestational complications such as gestational diabetes would be somewhat different if all women were tested. We are also aware of the bias that may be caused by testing a specific high risk group of non-residents.

In light of the findings of the current study, we suggest that Israeli health authorities assess the cost-effectiveness of a subsidized healthcare package for non-residents in order to improve antenatal surveillance and minimize morbidity and financial losses.

Acknowledgment. Esther Eshkol is thanked for editorial assistance.

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