

Obstetrical Outcomes among Non-local Chinese Pregnant Women in Hong Kong

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Objectives:

To compare the maternal and fetal obstetrical outcomes of local (Hong Kong) and non-local Chinese pregnant women giving birth between 2004 and 2006 at the Princess Margaret Hospital in Hong Kong.

Methods:

This was a retrospective analysis using data from the computerised database (OBSCIS) of Princess Margaret Hospital from 2004 to 2006. Two distinct obstetric populations, local Chinese residents and non-local Chinese from mainland China, were compared for any differences in maternal and fetal outcomes. Statistical analysis was performed with the SPSS package. Continuous variables were analysed using Student's *t*-test, and categorical variables by Chi-square tests. Statistical significance was set at $p < 0.05$.

Results:

Compared to the local Chinese population, the pregnant women from mainland China were younger, of lower parity, and had less pre-existing medical problems. However, they had a higher chance of unplanned vaginal breech delivery, severe hypertensive disease in pregnancy, pre-eclampsia, delivering before arrival to hospital, and giving birth post-term (≥ 42 weeks). Neonatal complications including pre-term birth, stillbirths, and neonatal deaths were also more frequent among the non-local Chinese pregnant women.

Conclusion:

To prevent avoidable obstetrics complications among the increasing numbers of non-local Chinese women giving birth in Hong Kong, the importance of regular antenatal care needs emphasis.

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Keywords: Birth weight; Pregnancy complication; Pregnancy outcome

Introduction

Since 2003 when the 'visa-free' policy for tourists from Mainland China was implemented to boost the Hong Kong economy, there has been an escalating trend in the number of persons from different provinces of China entering Hong Kong. Among them, there was a substantial number of pregnant women (contributing to one quarter of the total deliveries in Hong Kong in 2003)¹. After crossing the border and delivering their babies in Hong Kong, they expected to obtain the permanent residency for their children. This influx also leads to a major surge of obstetric workload in Hong Kong public hospitals.

By April 2003, the Hospital Authority (HA) of Hong Kong devised a new obstetrics package for this group of non-local expectant mothers who received obstetrical care in Hong Kong. The price of the package was HK\$20,000 and entailed a 3-day-2-night delivery service + HK\$3,000 for each extra day of hospital stay. With the advent of this charging policy for the non-local mothers to avoid / minimise hospital charges, most of

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these subjects booked late, defaulted antenatal follow-up, and requested early discharge. They therefore posed the problems associated with uncertain maturity, absence of antenatal care, and last-minute attendance for delivery. Besides, they came from lower socio-economic backgrounds, which made them more vulnerable, and presumably more liable to unfavourable obstetrical outcomes. Similar obstetrical outcome studies have been conducted in the past to look at socio-economically disadvantaged groups of pregnant women, though these did not show that the obstetrical outcomes were worse^{2,3}.

As one of the major obstetrics units in the Kowloon West Cluster of Hong Kong, the Princess Margaret Hospital has an annual delivery rate of about 4,000. From 2004 to 2006, approximately 35% of the total number of deliveries of women we managed were of non-local Chinese women. With the large influx of pregnant women from mainland China delivered in Hong Kong after the 'visa-free' policy implemented, we postulated that they may reveal worse obstetrical and perinatal outcomes. We therefore undertook a retrospective review of any differences in obstetrical outcomes among non-local Chinese from mainland China and local Chinese residents, before the implementation of the current new obstetrics package in 2007.

Methods

The medical records of all women delivered during the period of 1 January 2004 to 31 December 2006 at Princess Margaret Hospital were retrieved for analysis, through the hospital Obstetrics Specialty Clinical Information System (OBSCIS). This System captures the antenatal, intrapartum, and postnatal information as well as the neonatal outcomes of every delivery in the public hospitals of Hong Kong. In our hospital, data entry into the system was performed by the nursing staff immediately after delivery and confirmed by medical staff after the subject's discharge from hospital.

Two distinct obstetrics groups were identified for analysis. Residents holding a valid Hong Kong Identification Card were classified as local expectant mothers. Women who entered Hong Kong legally on temporary permits and those who either overstayed or those without valid documentation to enter Hong Kong were classified as non-local expectant mothers. Only

women of 'Chinese' ethnicity were included in this study.

Information retrieved from the database included maternal characteristics (age, parity, order of pregnancy, and maternal medical diseases), and common antenatal complications (antepartum haemorrhage, hypertensive disease in pregnancy, and gestational diabetes). Gestational diabetes was defined as a fasting glucose value of ≥ 7 mmol/L or 2-hour post-prandial glucose level of ≥ 11.1 mmol/L after a 75-g oral glucose tolerance test during pregnancy. Hypertensive diseases in pregnancy included gestational hypertension, gestational proteinuria, pre-eclampsia, eclampsia, chronic hypertension, and chronic hypertension with superimposed pre-eclampsia. Intrapartum complications included pyrexia, uterine rupture, shoulder dystocia, hysterectomy, and maternal death. Delivery details (previous caesarean section, induction of labour, mode of delivery, pre-term delivery, post-term delivery, and post-partum haemorrhage >500 ml) and neonatal outcomes (birth weight, admission to neonatal intensive care unit [ICU], born before arrival, stillbirth, neonatal death, congenital abnormality, and fetal complications) were also retrieved.

Except for postnatal follow-up (not provided to non-local subjects), provision of all obstetrical services (antenatal check-up, intrapartum, and postnatal care) were the same for local and non-local mothers, although the latter were charged a fee.

Statistical analysis was performed with the Statistical Package for the Social Sciences (Windows version 10.0; SPSS Inc, Chicago [IL], US). Continuous variables were analysed using independent *t*-tests and categorical variables by Chi-square analysis. Statistical significance was set at a *p* value of <0.05 .

Results

A total of 13,312 Chinese pregnant women who delivered at Princess Margaret Hospital from January 2004 to December 2006 were included this study. Of these, 8,655 (65%) were Hong Kong residents and 4,657 (35%) were non-local expectant mothers. In 2004, the number of non-local expectant mothers delivered in our hospital was 1,158 (27%), and since then the number has steadily increased; the number being 1,631 women (34%) in 2005 and 1,868 women (43%) in 2006.

Table 1. Maternal characteristics: Hong Kong residents versus non-local Chinese mothers

Characteristic	HK residents (n=8655)	Non-local Chinese (n=4657)	p Value
Mean (standard deviation) age (years)	31 (5.3)	28 (4.7)	0.0001
Parity			
0	4228 (48.9%)	2420 (52.0%)	0.0008
1	3368 (38.9%)	1827 (39.2%)	0.7204
2	817 (9.4%)	325 (7.0%)	0.0001
3	174 (2.0%)	62 (1.3%)	0.0046
4	48 (0.6%)	18 (0.4%)	0.2351
>5	20 (0.2%)	5 (0.1%)	0.2398
Previous caesarean section	1252 (15.3%)	317 (6.2%)	0.0001

Table 2. Pre-existing maternal diseases: Hong Kong residents versus non-local Chinese mothers

Pre-existing disease	HK residents (n=8655)	Non-local Chinese (n=4657)	p Value
Anaemia	470 (5.4%)	132 (2.8%)	0.0001
Cardiac disease	68 (0.8%)	19 (0.4%)	0.0136
Chronic hypertension	10 (0.1%)	0	0.0234
Diabetes	10 (0.1%)	4 (0.1%)	0.8236
Renal disease	21 (0.2%)	4 (0.1%)	0.0460
Syphilis	24 (0.3%)	12 (0.3%)	0.6377
Sexually transmitted diseases	14 (0.2%)	3 (0.1%)	0.1337

Table 3. Antepartum complications: Hong Kong resident versus non-local Chinese mothers

Complications	HK residents (n=8655)	Non-local Chinese (n=4657)	p Value
Antepartum haemorrhage	135 (1.6%)	51 (1.1%)	0.0356
Gestational diabetes	82 (0.9%)	6 (0.1%)	0.0001
Degree of hypertensive disease in pregnancy (n=995)			
Mild hypertension / transient high blood pressure	676 (88.4%)	167 (72.6%)	0.0001
Severe hypertension	89 (11.6%)	63 (27.4%)	0.0001
Class of hypertensive disease in pregnancy			
Pre-eclampsia	87 (11.3%)	54 (23.5%)	0.0001
Eclampsia	8 (1.0%)	6 (2.6%)	0.0776

Non-local expectant mothers were significantly younger, of lower parity than the local mothers, and also had fewer previous caesarean sections (Table 1). Moreover, the non-local mothers had a lower prevalence of pre-existing diseases including anaemia, cardiac disorder, chronic hypertension, and renal disease (Table 2). There was no statistical significant difference in the proportion with sexually transmitted diseases, including proven syphilis.

Regarding antenatal complications, non-local parturients had significantly lower risks of antepartum haemorrhage and gestational diabetes. However, they usually presented with more severe hypertensive disease and a significantly higher risk of pre-eclampsia (Table 3).

There was no statistically significant difference between the two groups with respect to intrapartum and postpartum complications, including pyrexia during

Table 4. Characteristics of labour and delivery: Hong Kong residents versus non-local Chinese mothers

Characteristics	HK residents (n=8655)	Non-local Chinese (n=4657)	p Value
Induction of labour	1372 (15.9%)	469 (10.1%)	0.0001
Pre-term delivery (<37 weeks)	579 (6.7%)	365 (7.8%)	0.0159
Post-term delivery (≥42 weeks)	191 (2.2%)	156 (3.3%)	0.0001
Born before arrival to hospital	19 (0.2%)	81 (1.7%)	0.0001
Elective caesarean section	479 (5.5%)	37 (0.8%)	0.0001
Emergency caesarean section	869 (10.0%)	464 (10.0%)	0.8878
Instrumental delivery	519 (6.0%)	222 (4.8%)	0.0032
Vaginal breech delivery	21 (0.2%)	30 (0.6%)	0.0003

Table 5. Fetal and neonatal outcomes: Hong Kong residents versus non-local Chinese mothers

Outcome	HK residents (n=8655)	Non-local Chinese (n=4657)	p Value
Mean (standard deviation) birth weight (g)	3160 (549)	3236 (462)	0.0001
Congenital abnormality	38 (0.4%)	16 (0.3%)	0.4085
Fetal complications	436 (5.0%)	180 (3.9%)	0.0021
NICU* admission	762 (8.8%)	441 (9.5%)	0.2016
Stillbirth	27 (0.3%)	28 (0.6%)	0.0131
Neonatal death	10 (0.1%)	18 (0.4%)	0.0011

* NICU = neonatal intensive care unit

labour, uterine rupture, hysterectomy, shoulder dystocia, postpartum haemorrhage (defined as estimated blood loss >500 ml) and maternal death.

Concerning labour and delivery, non-local mothers had a significantly smaller proportion having labour induced. A greater proportion had pre-term labour (defined as delivery at <37 completed weeks) as well as more post-date delivery (defined as delivery at ≥42 completed weeks). Also, a significantly greater proportion of their babies were born before the women reached hospital.

Regarding the mode of delivery, among the non-local expectant mothers there was a significantly smaller proportion who had elective Caesarean sections and instrumental deliveries, whilst a higher proportion had breech vaginal deliveries. There was no difference in the number of emergency caesarean sections in the two groups (Table 4).

Neonatal outcomes in the two obstetric groups are summarised in Table 5. Babies from the non-local

mothers were significantly heavier than those of local mothers. They also had a lower proportion with fetal complications (abnormal lie, breech presentation, confirmed intra-uterine growth restriction [IUGR], confirmed or suspected fetal abnormality, cord presentation, intra-uterine death, macrosomia, oligo- / poly-hydramnios, decreased fetal movements, suspected IUGR, unstable lie, and others). However, there was significantly more liability to stillbirth and neonatal death in non-local mothers. On comparing the proportion of neonatal ICU admissions and congenital abnormalities, there was no difference between the two groups.

Discussion

After the return of Hong Kong Special Administrative Region (SAR) to China in 1997, the economic relationship between the SAR and the mainland has been closer than ever. It is easier for people from the mainland to cross the border into Hong Kong. Since the implementation of the 'visa-free' policy after the severe acute respiratory syndrome turmoil in 2003, the number of travellers from mainland China increased significantly. Also, with the growing number of cross-

border marriages⁴, more pregnant women from mainland China came to Hong Kong to deliver their babies, so as to obtain the permanent residency and legitimise their child's right of citizenship as a Hong Kong resident, which included 9 years of compulsory education. This phenomenon has been called "social obstetrics"⁵.

This large influx of obstetric patients from mainland China posed an extra burden on our health care system. According to the HA Annual Obstetrics Reports^{1,6-8}, the proportion of non-entitled persons delivered in Hong Kong increased from 25% in 2003 to 30% in 2004, and rose to 34% in 2005 and then dropped slightly to 30% in 2006. Local mothers enjoy a more-than-90% subsidy in using the health care service. For the same services, non-entitled mothers need to pay a sum of HK\$20,000 for a 3-day-2-night delivery package + HK\$3,000 for each extra day's stay in hospital. They also need to pay HK\$700 per outpatient antenatal visit. This charging policy levied on non-local expectant mothers was implemented since April 2003. Due to the resulting financial constraints, many non-local mothers attend the delivery service very late, in order to avoid the charges. This observation is also supported by the significantly greater proportion of corresponding babies born before their mothers reach hospital. The scarce number of antenatal visits and the variable standard of antenatal care received in China also pose higher risks at delivery and hence worse obstetrical outcomes⁹.

Analysis of the 3-year delivery details in Princess Margaret Hospital (a major hospital providing obstetrical services in the Kowloon West Cluster of Hong Kong) reveals that non-local expectant mothers have more preventable maternal and neonatal complications.

Regarding the background maternal medical risks, the non-local mothers generally had less pre-existing medical diseases (hypertension and cardiac disorders). They also had lower proportions with gestational diabetes and mild hypertensive disease in pregnancy. This may actually be a reflection of less antenatal screening with the result that pre-existing conditions are not picked up early in pregnancy. Furthermore, when the non-local women present for delivery late (some of whom have had no antenatal care), the possibility of under-reporting of complications / problems must be considered.

The risk of antepartum complications, such as antepartum haemorrhage, appeared lower among the non-local mothers. A possible explanation was that such mothers suffered their antepartum complications in the mainland, and were thus unfit to cross the border for consultation and delivery.

The importance of antenatal surveillance is reflected by the significantly larger proportion of non-local mothers having more severe forms of hypertensive diseases including pre-eclampsia in pregnancy (23.5%). There was also a trend towards more eclampsia (2.6%) among the non-local mothers. Compared to figures detailed in the territory-wide O&G audit report in 2004¹⁰, the proportion of mothers with severe pre-eclampsia and eclampsia were lower than that in our study, in which the respective prevalence rates were 19.3% and 1.4%. The report also stated that perinatal mortality was highest in parturients with severe forms of hypertensive disorder, being almost eight times higher than in those without hypertension¹⁰. To prevent the progression of mild forms of hypertension to the more severe forms, frequent antenatal visits allow earlier pick-up and control of problems, such as severe pre-eclampsia. Early detection and treatment can prevent maternal complications such as eclampsia and reduce perinatal mortality.

Lack of regular antenatal check-ups among the non-local mothers was reflected by the higher proportion of breech vaginal deliveries. Usually for breech presentation at term, we offer external cephalic version or elective caesarean section, as breech delivery confers higher perinatal morbidity and mortality¹¹.

As the course of pregnancy is less planned among the non-local mothers, the proportion having induction of labour and elective caesarean sections is also comparatively lower. This phenomenon was also reflected in the HA Annual Obstetrics Report (2004-2006), which demonstrated a persistently smaller proportion having induction of labour and elective caesarean sections in non-local expectant mothers^{1,7,8}.

The higher incidence of post-term delivery in non-local mothers may be explained by inaccurate date calculation. Falsification of the expected date of delivery by non-local mothers could avoid being deported when

approaching term. Non-local mothers with expired visas may hide to avoid detection by immigration officials. The resulting post-term pregnancies are associated with an increase in perinatal mortality. The incidence of early neonatal seizures, a marker of perinatal asphyxia, is between 2 and 5 times higher in infants born after 41 weeks¹².

Pre-term labour and delivery in non-local mothers may be due to the stress imposed by being an overstayer or illegal immigrant^{13,14}. The higher proportion of pre-term deliveries among the non-local mothers could also be secondary to the larger number of tertiary transfers from the private sector. The high charges for special baby care units and neonatal ICUs in private hospitals may not be affordable for certain non-local mothers.

Regarding neonatal outcomes, we noted a larger proportion of stillbirths and neonatal deaths among non-local mothers. Although the cause of most stillbirths was unknown, they reflect a lesser degree of antenatal surveillance in the non-local mothers, resulting in undiagnosed or late recognition of fetal compromise. Moreover, as shown in this study, the larger proportions of mothers with severe hypertensive disease in pregnancy, pre-eclampsia, and pre-term and post-date births, may all contribute to the significantly larger number of stillbirths and neonatal deaths among the non-local expectant mothers.

This was a retrospective study performed in a single hospital, involving data retrieval from the hospital database system only. Information such as the number of antenatal visits, the quality of antenatal care, and the family income of the non-local mothers was lacking. We are aware of these limitations and the possible resultant selection bias. With these limitations in mind, we found that the non-local expectant mothers were more likely to have antenatal complications, such as vaginal breech delivery, severe hypertensive disease, and pre-eclampsia. They also had a larger proportion of deliveries before arrival to hospitals. They are also more liable to endure pre-term labour, post-term deliveries, stillbirths, and neonatal deaths. Most of these adverse obstetrical outcomes among non-local mothers are preventable.

To reduce last-minute attendance for delivery and obtain resources for the provision of the necessary extra health care, since February 2007 the HA has again implemented a new delivery package for the non-local expectant mothers¹⁵. This package charges at HK\$39,000 for booked non-local expectant mother who choose to deliver in Hong Kong and HK\$48,000 for those not booked with the HA. Booked non-local mothers are offered one antenatal outpatient visit at an HA hospital and a 3-day-2-night delivery service. This new policy has already been implemented for more than 1 year; and there is interest in assessing its impact in reducing last-minute consultations and improving obstetrical outcome among the non-local Chinese pregnant women.

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