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A Pilot Study of Birth Outcomes and Relevant Factors among Vietnam Foreign-Spouse Mothers in comparison with Taiwanese Mothers in Taiwan

Su-Hsing Lee, Mei-Hui Lin, Shyan-Shu Shieh
Department of Occupational Safety and Health
Chang-Jung Christian University
396 Chang-Jung Rd., Sec. 1, Kway-Jen, Tainan,
Taiwan. R.O.C.
http://www.cju.edu.tw

Abstract: - This study was conducted to evaluate the outcome of birth and relevant factors among Vietnam foreign-spouse mothers in comparison with Taiwanese mothers.

1664 newborns, that delivered by Vietnam and Taiwanese mothers, born between January 1, 1998 and June 30, 2002 from a southern town in Taiwan were studies. Compared to Taiwanese mothers, Vietnam mothers were found to deliver smaller babies (3035g vs 3137g, $p<0.05$) with a higher proportion of low birthweight (7.1% vs 4.8%). After adjusting for gender, birth orders, term status and maternal age, the risk (Odds Ratio) of delivering low birthweight newborns for Vietnam mothers compared to Taiwanese mothers was 1.42 (95%CI=0.45-4.50).

In a sub-study, from the same population, 101 Taiwanese mothers were matched to 66 Vietnam mothers by maternal age, term status and birth orders. In sub-study, the risk estimation of low birthweight delivery were increased to twofold for Vietnam mothers compared to Taiwanese mothers (OR=1.99, 95%CI=0.51-7.69). Further controlling for gender of newborns, food intake, smoking status, and paternal work status, the OR turned into 2.49 (95%CI=0.53-11.82).

This study suggests that maternal origins have potential impact on birth outcomes. Comparing to Taiwanese mothers, Vietnam mothers in Taiwan were having more adverse health and social situations regarding to the pregnancy.

Key-Words: - low birthweight, ethnicity, newborns, Vietnam foreign spouses, Taiwan

1 Introduction

Since the mid 1980s, cross-country marriage between South Asian brides and Taiwanese groom has steady increased [1]. Similar phenomenon was also noted in Japan [2]. As indicated by researchers in Japan and Taiwan, recent industrialization had changed the work conditions and life-styles in the city and rural areas. In rural areas, young men were having difficulties to find their brides [1-2]. As a result, foreign brides became popular in rural areas. According to the Department of Internal Affairs in Taiwan, at the end of 2003, there were 70,097 foreign spouses resided in Taiwan, 67% of them were from Vietnam, followed by Indonesia (15%) and Thailand (6%) [3].

A survey conducted among 398 Vietnam spouses, through the Vietnam Economic and Culture Office in Taipei, indicated that 49% of these spouses were less than 25 years old (average age at 26.7) and 0.5% possessed college or higher degree [4]. This study also showed that husbands of these foreign spouses were more likely to be older (average age at 39) and 8.7% of them held a college or higher degree. Occupations of these husbands primarily consisted of farmers, blue-collar workers, transportation drivers, and shop owners.

In Chinese culture, producing offspring was considered an important task in a marriage; even nowadays many still believe so. Previous studies indicated intention that Taiwanese bridegrooms married foreign brides was to produce offspring [1, 5]. Contribution of foreign spouse in bearing young Taiwanese generation was noticeable; according to birth registry in 2000, 12% of Taiwanese newborns were delivered by foreign-spouse mothers [6]. Based on observation of a group of foreign-spouse mothers, researchers in Taiwan found that 86% of these mothers delivered their first-born child in the first two years of their marriage [7]. It is thus clear that most foreign-spouse mothers not only went through the acculturation but also experienced their first pregnancy experience right after the immigration.

Foreign-spouses mothers are potentially under greater risk for adverse birth outcomes due to their unusually situations. This study was, therefore, conducted to evaluate the outcomes of birth and relevant factors regarding to the pregnancy among Vietnam foreign-spouse mothers in comparison with Taiwanese mothers.

2 Method

Study population contained all the single livebirths, that descending from Vietnam or Taiwanese mothers, registered between January 1, 1998 and June 30, 2002, in a rural town located in southern Taiwan. For each birth the following information was extracted form the birth registration form and coded: date of birth (month and year), gender, birth order, gestational age (in weeks), birthweight (in grams), mother's identification number, year of birth of mother, father's identification number, year of birth of father, and facilities of delivery.

In the record, a mother born outside the area of Taiwan was given a code number that was different from the standard identification code. We were, therefore, able to differentiate whether the newborn's mothers were originated from Taiwan or not. In the study town, since 1992, Household Registration Office started to keep a supplemental database that listed the name, address and origins of all the foreign spouses and their husbands. Information in this database was collected when the new couples arrived at the office for marriage registration. Linked by mother's name and address between birth registration and the supplemental database, we were able to identify 84 Vietnam mothers during the study period.

Since the information obtained from the birth registry was limited, a sub-study was further conducted to evaluate relevant factors regarding to the pregnancy. Study subjects in the sub-study included all the Vietnam mothers and a sample of Taiwanese mothers from the original study population. In the end, we were able to locate 66 (79%) Vietnam mothers for personal interview and a random sample of 101 Taiwanese mothers for telephone interview. In the process of selection, Taiwanese mothers were frequency matched to Vietnam mothers by birth orders (first or second birth), maternal age (classified into four groups, less than 20, 20 to 24, 25 to 29 and greater than 29), and term status (classified as preterm and full-term). A Vietnam interpreter was trained to conduct personal interview with Vietnam mothers.

During the interview, we collected information relevant to pregnancy period about maternal factors (including smoking habit, prenatal check-up, miscarriage history, food intake, self-rated stress level, and work status) and social factors (including family violence and satisfaction of marriage, husband's work status and husband's educational level).

In data analysis, low birthweight was defined as birthweight less than 2500 g, regardless of gestational age. Preterm delivery implied a gestation at birth of less than 37 completed weeks, while term was defined as a gestational age of 37-42 completed weeks. In descriptive analysis, we compared the means and frequencies of maternal age and birth outcomes (birthweight, gender of newborns, birth orders and week of gestation). Statistical significance was ascertained using the x^2-test for differences in qualitative variables and the t-test for differences in continuous variables. Logistic regression analysis, that provided Odds Ratio (OR), was used to model the dependence of low birthweight on maternal originals (Vietnam vs Taiwan), and, in multivariate analysis, further controlling for maternal age, birth orders, term status and gender of newborns). In the logistic function, the estimated odds of an event are

$$\hat{y}/(1-\hat{y}) = \mathrm{e}^{\alpha+\beta_1 x_1+\beta_2 x_2+\Lambda+\beta_k x_k} \quad (1)$$

$\hat{y}$ is the estimated probability of event; $1-\hat{y}$ is the estimated probability of no event; each of the β_k can be interpreted as logarithm of an odds ratio relating disease to the variable x_k, after adjusting for all other x variables.

In the sub-study, frequencies of relevant factors regarding to the pregnancy were described separately for Vietnam and Taiwanese mothers. Logistic Regression was also used to model the dependence of low birthweight on maternal originals, further controlling for relevant factors regarding to the pregnancy period. Change-in-estimation method was used for selection of control factors [8]. Data analysis was performed by SAS (8.2) statistical package.

3 Results

A total of 1748 single livebirths were registered

between January 1, 1998 and June 30, 2002 in the study township. Of the 1748 births, 28 were twins and therefore were excluded from the study. Of the 1720 single livebirths, the origin of mothers was distributed as follows: 92% (1580) from Taiwan, 5% (84) from Vietnam, 2% (38) from Mainland China, and 1% (18) from other countries, including Indonesia (9), Philippine (4), Cambodia (3), and Thailand (2). Therefore, 84 Vietnam and 1580 Taiwanese mothers were included in this study.

Compared to Taiwanese mothers, Vietnam mothers were found to bear smaller babies (3035g vs 3137g, $p<0.05$). There was a 14 years mean age difference between Vietnam mothers and their husbands, in contrast to 3 years difference between Taiwanese mothers and their husbands.

As shown in Table 1, Vietnam mothers were more likely to having first-born babies (94%) at the location of clinics (92%). Low bithweight was more commonly occurred among Vietnam mothers than Taiwanese mothers (7.1% and 4.8%, respectively).

In Table 2, univariate analysis indicated Vietnam mothers had slightly elevated risk, although not statistically significant, in delivering low birthweight newborns than Taiwanese mothers (OR=1.52, 95%CI=0.64-3.60). After adjusting for gender, birth orders, term status and maternal age, the OR did not change much (OR=1.42, 95%CI=0.45-4.50).

In the sub-study, after matching on age, term status and birth orders, 66 Vietnam and 101 Taiwanese mothers were further compared. In characteristics, 66 Vietnam mothers in the sub-study were slightly varied from the 84 mothers in the original population in age (24 vs 23), proportion of pretrem (7.6% vs 7.1%), birthweight (3052 vs 3034) and birth order (80% of first born vs 84%).

In the sub-study, the risk estimation of low birthweight delivery were increased to twofold for Vietnam mothers compared to Taiwanese mothers (OR=1.99, 95%CI=0.51- 7.69).

Table 1. Characteristics of Newborns

Characteristics	Taiwan % (n=1580)	Vietnam % (n=84)
Gender of Newborns	50.9	45.2
Male	49.1	54.8
Female		
Birth Order*		
1	45.1	84.3
2	37.2	15.7
$\geq$ 3	17.7	
Birth Location*		
Hospitals	31.0	8.3
Clinics	68.8	91.7
Birthweight*		
< 2500	4.8	7.1
2500 - 2999	27.1	33.3
3000 - 3499	47.5	45.2
$\geq$ 3500	20.6	14.3
Term status		
preterm	6.5	7.1
full-term	93.4	92.9

* $p<0.05$

Table 3 lists frequencies and birthweights by relevant factors regarding to pregnancy period between Vietnam and Taiwanese mothers.

Table 2. Odds Ratios (OR) of Factors Associated with Low Birthweight

	Number	Low Birthweight (%)	Odds Ratios	Adjusted Odds Ratios*
Maternal Origins				
Taiwan	1580	4.8	1	1
Vietnam	84	7.1	1.52 (0.64 – 3.60)	1.42 (0.476– 4.42)
Gender of Newborns				
Male	842	4.0	1	1
Female	822	5.8	1.47 (0.94 – 2.31)	1.80 (1.04 – 3.13)
Birth Order				
1	782	6.5	1	
2	601	4.2	0.62 (0.38 – 1.02)	0.56 (0.31 – 1.04)
3	279	2.1	0.32 (0.13 – 0.74)	0.29 (0.11 – 0.77)
Unknown	2	0		
Term status				

Preterm	101	51.5	1	1
Full-term	1562	1.9	0.02 (0.01 – 0.03)	0.02 (0.01 – 0.03)
Unknown	1	0		
Maternal age				
<22	131	8.4	1	
22-27	657	4.3	0.49 (0.24 – 1.00)	0.57 (0.23 – 1.42)
>28	861	5.0	0.57 (0.32 – 1.14)	0.84 (0.34 – 2.07)
Unknown	15	0		

* Model includes all the listed variables.

Table 3. Frequencies and Birthweight by Relevant Factors Regarding to Pregnancy Period between Vietnam and Taiwanese Mothers

	Vietnam Mothers (n=66)		Taiwanese mothers (n=101)	
	Number (%)	Mean Weight (g)	Number (%)	Mean Weight (g)
Prenatal Check-up				
On-time	61 (92.4)	3024	101 (100)	3109
Intermittent	3 (4.6)	3500	-	-
When problems occurred	1 (1.5)	2800	-	-
Before labor	1 (1.5)	3650	-	-
Smoking				
Yes	0	-	5 (4.9))	2828
No	66	3052	96 (95.1)	3123
Miscarriage History				
Yes	8 (12.1)	3161	9 (8.9)	3014
No	58 (87.9)	3037	92 (91.1)	3118
Food Intake				
Plenty	57 (86.4)	3087	83 (82.2)	3157
Moderate	6 (9.1)	2829	17 (16.8)	2903
Poor	3 (4.5)	2740	1 (1)	2600
Self-Rated Stress Level				
High	17 (25.8)	3021	19 (18.8)	3082
Low	49 (74.2)	3063	82 (81.2)	3115
Work Status				
Full-time	24 (36.4)	3088	58 (57.4)	3152
Work at home	15 (22.7)	3060	1 (1)	2350
Housewife	27 (40.9)	3015	42 (41.6)	3066
Family Violence				
Yes	2 (3)	2850	1 (1)	2500
No	64 (97)	3058	100 (99)	3115
Satisfaction of Marriage				
Satisfaction	47 (71.2)	3087	73 (72.3)	3151
Moderate	7 (10.6)	2921	26 (25.7)	3037
Not satisfaction	12 (18.2)	2993	2 (2.0)	2475
Husband's Work Status				
Full-time	59 (89.4)	3074	98 (97)	3109
Part-time or self-employed	7 (10.6)	2864	3 (3)	3100
Husband's Educational Level				
Junior high and lower	31 (47)	3120	15 (14.8)	3137
Senior high and up	19 (28.8)	3014	85 (84.2)	3100
Unknown	16 (24.2	2964	1 (1)	3028

Food intake and satisfaction to marriage were found statistically related to birthweight

($p<0.05$). Comparing these factors between Vietnam and Taiwanese mothers, the result showed that a higher percentage of Vietnam mothers worked at home (23% vs 1%, $p<0.0001$) did not satisfy with their marriage (18% vs 2%, $p<0.001$), married to a husband working part-time or self-employed (10.6% vs 3%, $p<0.05$) and married to a husband without high school diploma (47% vs 15%, $p<0.0001$). All the Taiwanese mothers completed their prenatal check-up, while 7% of Vietnam mothers did not; in contrast, all the Vietnam mothers did not smoke, while 5% of Taiwanese mothers do smoke during their pregnancy.

Finally, multivariate analysis was conducted (in Table 4); after controlling for gender of newborns, food intake, smoking status and paternal work status, OR of low birthweight delivery for Vietnam mothers compared to Taiwanese mothers turned to 2.49 (95%CI=0.53 – 11.82).

Table 4. Odds Ratios of Factors Associated with Low Birthweight, Based on Multivariate Analysis

Variables*	Odds Ratio (95% CI)
Vietnam vs Taiwan†	2.49 (0.53 – 11.82)
Female vs. Male newborns	0.42 (0.08 – 2.27)
Plenty vs moderate to poor food intake†	3.91 (0.84 – 18.17)
Smoking	2.40 (0.14 – 42.37)
Paternal Work Status†	
Full-time vs part-time or self-employed	4.02 (0.57 – 28.21)

*Selection of controlling variables were based on Chang-in-estimation method
† $p \leq 0.25$

4 Discussion

Comparison of birth outcomes between ethnicities had been conducted among a variety of ethnics, such as the comparisons of African, Asian, Latino, Indian, and white descending in the U.S., the comparisons of Dutch, Asian, African and Mediterranean descending in Netherlands, and the comparisons of Indian, Malaysian and Chinese descending in Singapore [9, 10-15]. These studies all confirmed the influence of ethnicity on birth outcomes. Similarly our study results showed that babies of Vietnam mothers were smaller in weight and larger in the proportion of low birthweight in comparison with babies of Taiwanese mothers, despites these babies were all having Taiwanese paternal descending.

Previous studies conducted among several regions in Vietnam reported low birthweight proportion in these areas ranged from 7.9% to 12.5% [16-17]. Comparing to our findings, it seems newborns with half Vietnam and half Taiwanese descending, such as our study subjects, were bigger than newborns of straight Vietnam descending, but were smaller than newborns of straight Taiwanese descending. It showed that a father's characteristics also possess certain degree of influence on birth outcomes. A study examining newborns with Japanese maternal descending in the US found that white race of father lowered the probability of low birthweight, and yet a father's race other than white or Japanese significantly increased the risk [18]. As yet, influence of father's ethnicity or characteristics (other than proxies of social economic status, such as occupation or education) on birth outcome has been explored only sparely. Our data suggests that further ethnic-specific inquires into the impact of paternal characteristics on birth outcomes are needed.

Besides ethnicity, other risk factors may also relate to low birthweight. Important risk factors such as social economic status and health care quality were previously considered as alternate explanations for discrepancies of birthweight in ethnic groups [17, 19]. In the sub-study, we further examined prenatal care and some social factors. The results, indeed, showed that Vietnam mothers and Taiwanese mothers were different in some of the factors. For example, 47% of Vietnam mothers married to a husband without high school diploma compared to 15% among Taiwanese mothers. In the sub-study, we preformed multivariate analysis to control for some of the prenatal health and social factors, the results showed that the OR, although not significant due to a relatively small sample size, remained high. Some previous studies also using multivariate method to control for risk factors in social economic status and maternal characteristics, they found the disparities of birth outcomes in ethnic groups still remained [17, 20].

In the birth registry data, birth order, term status, and maternal age were found to be associated with low birthweight. This result was similar to previous reports [9, 21]. In the sub-study, we found that Vietnam mothers were

more likely to experience adverse prenatal care and social factors, just as we expected from such matrimonial situation. Psychosocial risk perceived by mothers was reported to be associated with low birthweight independent of other known risk factors [22]. A study found that receiving more than 45 minutes of psychosocial service would reduce the rate of low birthweight regardless of other risk profiles [23]. In the acculturation process, foreign-spouse mothers are expected to receive more psychosocial stress, however, during our interview, we found that their support system mainly came from neighborhood foreign-spouses friends. Would this system provide sufficient support against language barrier, culture conflicts and family troubles (such as violence), these questions request more research for answer.

Although this is a population-based study, population of this study was not sufficiently large or diverse enough to represent the whole Taiwan area. Because health care system, social support and family structure are different between metropolitan/urban area and our study area, this study result is most proper to apply to rural areas in Taiwan. Despite such limitations, this study reveals the patterns of birth outcomes and relevant factors regarding to the pregnancy for Vietnam mothers. This study suggests that both maternal and paternal ethnic origins have potential impact on birth outcomes. Comparing to Taiwanese mothers, Vietnam mothers in Taiwan were having more adverse health and social situations regarding to the pregnancy. It is essential to further evaluate risks besides ethnicity differences, particular in factors such as acculturation, health care availability, social support, that can reduce individual level risk for low birthweight among foreign spouses in the future.

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