Antenatal Care Utilization and Infant Birthweight in Low Income Families

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The main purpose of this study is to evaluate the antenatal care utilization of pregnant women and their impacts on infant birth outcome in low income families.

Infant mortality has always been one of the more important issues in public health around the world, particularly for many low income families in developing countries.

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Low birth weight is a major factor that contributes significantly to infant mortality (Jewell 2007), and it not only increases medical utilization and medical cost, but also escalates the risks of delayed child development and social cost (Mwabu 2009).

Taiwan introduced its National Health Insurance (NHI) program in 1995 to provide all citizens equal access to health care. The medical coverage is generous, including comprehensive curative care and preventive care. All preventive care (but not curative care) users are exempt from co-payments.

To encourage women to receive antenatal care services early in the first trimester of pregnancy combined with a full course of antenatal care, NHI provides all women in Taiwan 10 free antenatal care visits under its preventive care items as well as free birth delivery.

Table 1 Antenatal visits of NHI in Taiwan

Card_seq_no	Timing	
IC41	12th week	
IC42	16th week	
IC43	20th week	
IC44	28th week	
IC45	32th week	
IC46	34th week	
IC47	36th week	
IC48	38th week	
IC49	39th week	
IC50	40th week	

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Recent studies on the effects of antenatal care on infant birth weight have showed that antenatal care use is modestly effective. Habibov and Fan (2011) found that one additional antenatal visit can increase birth weight by about 26g. When adjusting for gestational age, birth weight has been shown to rise by 17g per antenatal visit in Brazil (Wehby et al. 2009a).

Wehby et al. (2009b) noted about a 35g increase in birth weight per antenatal visit in Argentina and said that there is about a 30g decrease in birth weight per week for each delayed antenatal visit. Celik and Younis (2007) showed that an additional antenatal care visit increases birth weight by about 39g.

Methods

Data: This study uses 2005 National Health Insurance claims data and birth certificate data in Taiwan. We select women who gave birth in 2005 by dividing the sample to high income families (N=135,246) and low income families (N=68,575).

Two-stage regression estimation is used to examine the factors that affect the number of antenatal care visits first and then the relationship between antenatal care utilization and infant birthweight.

$$C = \alpha_0 + \alpha_1 x_1 + \alpha_2 x_2 + \alpha_3 x_3 + \alpha_4 x_4 + \alpha_5 x_5 + \alpha_6 x_6 + \alpha_7 x_7 + \alpha_8 x_8 + \alpha_9 x_9 + \alpha_{10} x_{10} + \mu$$

$$W = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_7 x_7 + \beta_8 x_8 + \hat{C} + \varepsilon$$

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Controlled variables:

Parity

Maternal age

Native mother

Maternal illness

Education(mother and father)

Geographic location

Urbanization

Hospital ownership

To meet the criteria of identification for a simultaneous equation model, in equation (1) we include another two variables, father's education and hospital ownership, which may only affect antenatal care use and not birthweight.

We are able to obtain consistent and asymptotically efficient parameters through the two-stage estimation. In the first stage of the empirical estimation, we get the fitted values of C(Antenatal visits) by OLS. In the second stage we estimate the structural equation of W(birthweights) after substituting C by the fitted values in equation (2).

Results

Mean of antenatal visits

Income	
high	8.06
low	7.74

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	Means of birthweights(g)		
	Total	High income	Low income
antenatal visits			
1	2831.98	2932.95	2777.08
2	2820.14	2819.85	2820.32
3	2874.83	2892.15	2854.42
4	3099.08	3115.69	3067.88
5	3051.45	3068.49	3023.73
6	3021.42	3033.48	3002.87
7	3052.14	3056.71	3044.41
8	3075.65	3081.90	3064.02
9	3137.04	3142.90	3124.86
10	3195.92	3203.10	3179.13

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Income	
high	3134.76
low	3096.28

The results show that pregnant women from low income families receive less antenatal care visits than their counterparts. Infants from low income families also tend to have lower birthweight than their counterparts.

Regression Results

High income families

Low income families

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Table 6 Antenatal visits and Birthweights for high income families

	Antenatal visits				Birthweights			
	Coef.	S.D.	P value		Coef.	S.D.	P value	
Constant	8.27	0.02	0.000	****	2851.01	31.75	0.000	****
Antenatal visits					33.22	3.92	0.000	****
Age under 19	-0.17	0.08	0.027	**	-90.21	15.68	0.000	****
Native	-0.15	0.04	0.000	****	-3.60	8.44	0.670	
Illness	0.09	0.01	0.000	****	-15.32	3.20	0.000	****

Table 7 Antenatal visits and Birthweights for low income families

	Antenatal visits				Birthweights			
	Coef.	S.D.	P value		Coef.	S.D.	P value	
Constant	8.07	0.03	0.000	****	2643.51	49.11	0.000	****
Antenatal visits					57.53	6.25	0.000	****
Age under 19	-0.26	0.04	0.000	****	-53.54	7.94	0.000	****
Native	-0.33	0.03	0.000	****	-26.82	7.72	0.001	***
Illness	0.18	0.02	0.000	****	-38.02	4.83	0.000	****

The number of antenatal care visits is found to be highly significant positively associated with infant birthweight, with an estimate of 57.5 for low income mothers and 33.2 for high income mothers.

Compared to 26~39 in other researches.

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This implies that pregnant women in low income families receive one more antenatal care visit will induce an increase of approximately 57.5g in birthweight for their infants.

The effects are almost double for low income mothers (57.5 vs 33.2).

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Moreover, those who are young, are less educated, are native and live in the less urbanization areas are more likely to have a low birth weight infant.

Conclusion

In order to reduce infant mortality and improve infant health and development, identifying the factors affecting low birth weight are crucial. Antenatal care is found to be a good approach to increase birth weight especially for low income mothers.

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To further improve both pregnant women's health and their infants' health, the governments need to put more efforts on providing antenatal care for pregnant women in low income families.

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Thank you for your attentions