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Does prenatal care benefit maternal health? A study of post-partum maternal care use

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ABSTRACT

Most studies on prenatal care focus on its effects on infant health, while studying less about the effects on maternal health. Using the Longitudinal Health Insurance claims data in Taiwan in a recursive bivariate probit model, this study examines the impact of adequate prenatal care on the probability of post-partum maternal hospitalization during the first 6 months after birth. The results show that adequate prenatal care significantly reduces the probability of post-partum maternal hospitalization among women who have had vaginal delivery by 43.8%. This finding suggests that the benefits of prenatal care may have been underestimated among women with vaginal delivery. Timely and adequate prenatal care not only creates a positive impact on infant health, but also yields significant benefits for post-partum maternal health. However, we do not find similar benefits of prenatal care for women undergoing a cesarean section.

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1. Introduction

The role of the quality of human capital in sustainable economic development cannot be overemphasized, with health being one of the most important components of human capital. As is commonly stated, children are the future of a nation, and the quality of their early life affects their future accumulation of human capital [1–3]. Indeed, one's health at birth is a valuable predictor of important future outcomes, such as earnings, education, and disability [4]. Consequently, the provision and promotion of prenatal

care is one of the most important and common government intervention.

Prenatal care theoretically provides benefits in two ways. First, an early detection of disorders allows physicians to take action in order to try and prevent premature births or neonatal deaths. Second, education and counseling during prenatal care help pregnant women maintain a healthy diet and lifestyle, which naturally can promote infant health and early childhood development as well as decrease post-partum maternal health problems. While these potential benefits most likely foster the health of both the mother and child, surprisingly, the literature has largely focused on the determinants of their utilization and the effects on newborns [5–8], with only a few studies investigating the impact of prenatal care on maternal health [9,10].

For policy-makers to determine the true utility or effectiveness of prenatal care programs, any evaluation should also account for their effects on both children and their

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mothers. Despite the wealth of literature on the effects of prenatal care on infant health, the conclusion is still not yet definitive. Traditionally, it is generally believed that prenatal care should improve newborn health, as suggested by earlier studies. For example, Gortmaker [11] finds that inadequate prenatal care is associated with higher risks of low birth weight for infants of white mothers who delivered in non-private general service hospitals and for all black mothers. The Institute of Medicine [12] also advocates the use of prenatal care as a cost-saving health intervention, precisely due to its protective effects at reducing low birth-weight infants.

Some recent studies, however, have argued that the effects of prenatal care on birth outcomes are very limited [8,13], or that the effects of prenatal care are not uniform across all types of pregnancies [14–16]. Acknowledging this, Conway and Deb [17] estimate the effects of prenatal care with a finite mixture model to allow for different effects on various types of pregnancies and show that there is a substantial effect on normal pregnancies, but not on complicated pregnancies. Given the benefits of prenatal care, the obvious next question is: what determines the utilization of prenatal care? This has been widely studied in both developed and developing countries [5–7,18,19].

The impact of prenatal care on maternal health, in contrast to the vigorous discussions of its effects on newborns, has been surprisingly poorly documented, perhaps because many take it for granted. A relevant research conducted in the USA by Conway and Kutinova [9] provides evidence suggesting that receiving timely and adequate prenatal care could help prevent mothers from being overweight or underweight, as well as help them avoid prolonged hospitalization after the delivery. However, their study does not control for mode of delivery (vaginal delivery versus cesarean section) and hence the risk of delivery, which is highly related to the hospital length of stay. Another study by Reichman et al. [10] investigates the effects of prenatal care on maternal post-partum parenting behaviors, finding that first-trimester prenatal care not only increases the likelihood of more well-baby visits and breastfeeding, but also reduces the prevalence of post-partum maternal smoking. The lack of a general measure of maternal health, however, prevents them from analyzing the effects of prenatal care on maternal health.

This present paper aims to explore the effects of prenatal care on post-partum maternal health, as indicated by inpatient maternal care use. Taiwan's universal health care system, with its detailed electronic claims database, lends itself as a good candidate for such a study. Using longitudinal health insurance claims data in Taiwan, this study examines the impact of adequate prenatal care on the probability of maternal re-hospitalization incidence during the first six months after birth. The estimation method adopted is a recursive bivariate probit model. In addition, our study divides the sample population into two types of delivery—vaginal delivery and cesarean section—in order to distinguish differences in the impact of prenatal care between these two groups of mothers.

The results show that adequate prenatal care use significantly reduces the probability of mothers who underwent vaginal delivery being readmitted to hospitals for

maternal health problems within the first 6-month post-partum period. However, we see no significant evidence for similar effects for mothers who had a cesarean section. This finding underlines the importance of adequate prenatal care on post-partum maternal health, particularly for women who had vaginal delivery. If we only consider the effects on the infant outcomes, the benefits of prenatal care will be underestimated.

The rest of the paper is organized as follows. The next section summarizes the maternal medical care in Taiwan, followed by the methodology section, which describes the study's setting, data, and empirical strategy used. Section 4 presents and discusses the empirical results. Section 5 concludes the study.

2. Maternal medical care in Taiwan

Taiwan implemented the National Health Insurance (NHI) program in 1995, with a generous maternal care benefit package, including free prenatal care, free delivery services, and postnatal care with little copayment for pregnant women—only a small registration fee of US\$3–10 (NT\$100–300) per visit. Prenatal services are quite comprehensive, as summarized below.

1. A total of 10 prenatal visits and physical check-ups (2 visits before the 17th week, 2 visits during the 17th and 28th weeks, and 6 visits after the 28th week).
2. Regular blood and urine tests.
3. Lab tests for syphilis, HIV, hepatitis B, and rubella.
4. Sonography in the 20th week.
5. Screening for gestational diabetes.
6. Behavior counseling to promote a healthy diet and lifestyle.
7. Genetic counseling for women 34 years of age or older or for women at high risk for having babies with congenital disorders.

3. Methodology

3.1. Data

The data are selected from the Longitudinal Health Insurance Database (LHID) in Taiwan. Under NHI, all contracted providers must submit claims electronically for reimbursement. The National Health Research Institute (NHRI) then assembles these claims and prepares them into a workable format for analysis. LHID is a sub-set of this database and contains all claims, including both outpatient and inpatient visits, for one million individuals randomly selected from the beneficiaries enrolled in 2005. As NHI covers more than 99% of the Taiwanese people, the sample is highly representative of the total population. The claims data are similar to the inpatient claim files for Medicare beneficiaries in the United States and contain detailed information on the services provided, the diagnoses (ICD-9 code), the date and duration of each service, total expenditure of each visit and its detailed breakdown, and the age and sex of the beneficiary.

We identify women who gave birth in 2005 as our study sample via the diagnosis-related group (DRG) codes

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