



Prenatal care demand and its effects on birth outcomes by birth defect status in Argentina

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ABSTRACT

Our objective was to identify determinants of prenatal care demand and evaluate the effects of this demand on low birth weight and preterm birth. Delay in initiating prenatal care was modeled as a function of pregnancy risk indicators, enabling factors, and regional characteristics. Conditional maximum likelihood (CML) estimation was used to model self-selection into prenatal care use when estimating its effectiveness. Birth registry data was collected post delivery on infants with and without common birth defects born in 1995–2002 in Argentina using a standard procedure. Several maternal health and fertility indicators had significant effects on prenatal care use. In the group without birth defects, prenatal care delay increased significantly LBW and preterm birth when accounting for self-selection using the CML model but not in the standard probit model. Prenatal care was found to be ineffective on average in the birth defect group. The self-selection of higher risk women into earlier initiation of prenatal care resulted in underestimation of prenatal care effectiveness when using a standard probit model with several covariates. Large improvements in birth outcomes are suggested with earlier initiation of prenatal care for pregnancies uncomplicated with birth defects in Argentina, implying large opportunity costs from the long waiting time observed in this sample (about 17 weeks on average). The suggested ineffectiveness for pregnancies complicated with common birth defects deserves further research.

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Improvement in health care over the past several decades has contributed to a substantial increase in the likelihood of survival of infants born prematurely and/or at low birth weight (LBW) as well as those born with birth defects and disabilities. Preterm birth and LBW have been widely associated with an increased risk for delayed development, physical disabilities and reduced life expect-

tancy. Child disability imposes a substantial burden on the affected child, family and community. Further, LBW has recently been shown to be related to lower human capital accumulation including education and wealth and lower maternal birth weight has also been related to lower birth weight in the offspring in a sample of low and middle income countries (Victoria et al., 2008).

A 7% LBW rate has been reported in Argentina in 1998 (Kramer et al., 2005). The rates of preterm birth and LBW have been increasing in the past two decades in several countries including by about 28% and 16% respectively in

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the US (Arias et al., 2003).¹ The rates of LBW and preterm birth have been estimated to have increased over the past decade in Argentina.²

The increasing prevalence of preterm and LBW births has generally been parallel to increases in multiple births and maternal age, yet the main causes of these outcomes remain unknown. LBW can occur due to shorter gestational age at birth and/or restricted uterine fetal growth. About 16% (20 million) of babies worldwide are born at LBW, with overall occurrence in developing countries being more than double of that in developed countries (16 versus 7%) (Lawn et al., 2005). Reliable estimates of the prevalence of preterm birth are less available for developing countries. Up to 28% of the 4 million neonatal deaths worldwide are directly related to preterm birth, and up to 80% occur among LBW infants.

Prenatal care use has generally been associated with some improvements in birth outcomes yet studies for less developed countries have been limited. This study augments this body of research using data from Argentina to evaluate the effects of risk indicators on prenatal care utilization, estimate the effects of prenatal care utilization on LBW and preterm birth in subgroups of normal versus abnormal births and explore the effects of other inputs and risk factors including multivitamin use, immunization and maternal health on these outcomes. Given that children born with birth defects are generally at a higher risk for preterm birth and LBW, the study assesses the effectiveness of prenatal care utilization in subgroups of infants born with selected common birth defects and normal infants to check for any heterogeneous impacts of prenatal care.

1. Prenatal care effectiveness

There have been several studies of the effects of prenatal care use on birth outcomes. A meta-analysis (Carroli et al., 2001) of seven randomized clinical trials (RCTs) found no significant differences in LBW occurrence between standard and reduced prenatal visit models (generally consistent with the results reported in each trial).³ Such results led to conclusions that increasing prenatal care may not be an effective intervention for improving perinatal outcomes in developing countries (Bhutta et al., 2005). However, this may not hold true given the rarity of such studies in developing countries and that

results on more developed countries may not be very applicable to less developed ones due to country differences in the rates of adverse birth outcomes, intensity of prenatal care use, quality of prenatal care, as well as the prevalence and type of risk factors that may modify the effects of prenatal care (such as maternal health risks and socioeconomic factors). Further, the RCTs mentioned above studied the effects of changes in number of visits but not in timing of prenatal care initiation, which may be a more relevant aspect of prenatal care use for fetal health.

Several econometric studies using birth registry and survey data have been also conducted. These studies highlighted the analytical complications due to maternal self-selection of prenatal care. Pregnant women may have some expectations of their pregnancy outcomes, based on their health status, pregnancy complications, pregnancy history and so on, and these expectations may affect their prenatal care demand. Women who perceive a larger risk for the ongoing pregnancy due for instance to unfavorable pregnancy history (e.g. prior low birth weight infant or spontaneous abortion) are expected to demand more prenatal care than those who perceive a lower risk, yet the indicators (e.g. pregnancy history) contributing to these risk perceptions may themselves be correlated with the health outcomes of the expected infant. For instance, having a previous low birth weight infant may predispose a future pregnancy to result in an underweight birth. Adverse self-selection (Rosenzweig and Schultz, 1982, 1983) entails opposite effects of perceived maternal risks on prenatal care demand (higher risk increases demand) and infant health (higher risk deteriorates infant health). Unfortunately, perceived risks are inadequately observed in typically available data as they may be related to many biologic and psychosocial indicators that might signal to the mother potential fetal health risks. Given that women who demand more prenatal care in this context have a higher propensity for adverse infant outcomes, the effectiveness of prenatal care use in producing infant health when estimated by classical regression models may be biased downward. On the other hand, prenatal care use is likely to be correlated with other health behaviors given that they are in part determined by the same set of individual preferences for health and for risk tolerance. For instance, women who are more risk averse and who value health more are expected to adopt healthier lifestyles (e.g. better nutrition and stress management, less smoking and drinking) than those who are less risk averse and value health less. The first group of women is expected to both demand more prenatal care and have larger propensities for healthy infants than the latter group. Given that health preferences and behaviors are also incompletely observed in typically available data, this type of self-selection is expected to result in overestimation (biased upward) of the effectiveness of prenatal care utilization unlike adverse self-selection, and is typically referred to as favorable self-selection. The net bias depends on the analytical model applied and the extent to which it controls for both these two types of self-selection.

Previous econometric studies have primarily applied instrumental variable (IV) or sample selection models to identify the effects of endogenous prenatal care use (e.g.

¹ In the US, the rates of LBW and preterm birth in 2002 were 13.3% and 17.5% respectively among African-American Infants compared to 6.9% and 11% respectively among White infants, and 6.5% and 11.6% respectively among Hispanic infants (Arias et al., 2003). In Brazil, about 11.8% and 16.2% of a representative sample of births in 2004 were born at LBW and preterm respectively (Barros et al., 2005).

² Kramer et al. (2005) reported a slight increase of 1.4% in the LBW rate between 1989 and 1998. Data from the Department of Statistics and Health Information of the Ministry of Health in Argentina suggest that the LBW and preterm birth rates might have increased over the past few years but these data should be viewed with caution since 2.8% and 15% of reported births had unspecified birth weight and gestational age respectively.

³ Four of these studies were in developed countries and three were in less developed countries.

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