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Birth Spacing and Sibling Health Inequality at Birth

Household decision making regarding resource allocation and fertility, i.e. timing, spacing and number of births impact child quality and sibling health inequality. Parents are concerned with child health and future fertility decisions are strategies that respond to realized child endowment. These fertility decisions impact child health and sibling inequality. The goal of this paper is to examine the effect of birth spacing on health inequality among siblings. The existence of both inter-household and intra-household endowment heterogeneity complicates the estimation of the birth spacing effect on sibling health differences.

We use an instrumental variables approach to circumvent the bias that arises due to the presence of unobserved endowment heterogeneity. Parents who have a preference for sons consider boys to have a higher endowment than girls and will choose to postpone the birth following the birth of a boy. This fertility decision incorporates the desire to spend more time, attention and monetary resources on the existing children, especially surviving sons in the household. Furthermore, access to modern methods of contraception aids parents in better realizing their spacing strategies. We utilize the causal effect of son preference and access to contraception on birth spacing to overcome the problem of endogeneity and identify the spacing effect on sibling health inequality.

The impact of birth spacing on child health may be attributed to a combination of two effects – maternal depletion and sibling competition effect. Closely spaced births lead to inadequate duration for the mother to recuperate from her previous birth, which may directly impact the health of the subsequent child. Furthermore, a short birth interval affects the quality and duration of lactation received by both children, which may have a detrimental effect on child health. Whereas the maternal depletion effect arises from the health status of the mother, the sibling competition effect is due to the limited resources in the household, including maternal time and attention, which is shared among closely spaced children.

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Hypotheses:

We expect to find that although an increase in birth spacing has a beneficial impact on the birth weight of infants; it also increases the inequality in the well-being of siblings at birth. These results, however, do not sound the death knell for the advocates of longer birth intervals. In fact, it strengthens the argument for prolonging birth intervals as longer birth intervals allow parents to make post-natal investments in the health of children who are worse-off.

Health technology:

The health at birth of child i in household j is determined by:

$$H_{ij} = \gamma_a A_{ij} + \gamma_p (A_{ij} - A_{i-1j}) + \sum_{k=2}^{i-1} \gamma_{pk} (A_{kj} - A_{k-1j}) + \gamma_o i + \gamma_g G_{ij} + \gamma_h Z_{ij} + \mu_j + \varepsilon_{ij} \qquad (1)$$

A_{ij} is the age of the mother at the birth of child i, and γ_a is the associated birth timing effect on child health; $(A_{ij} - A_{i-1j})$ is the birth interval between the index child and the prior sibling; γ_p is the corresponding birth spacing effect; γ_{pk} is the effect of previous birth intervals; γ_o is the birth order effect; γ_g is the effect of the gender, G, of the child; γ_h estimates the effect of prenatal investment Z in child i in household j; The term μ_j consists of the unobserved child-invariant household health heterogeneity that affects child health and consists of household health environment, son preference and the innate healthiness transferred from parents to children (Olsen and Wolpin, 1983; Rosenzweig, 1986; Rosenzweig and Wolpin, 1988); finally, ε_{ij} is the unobserved endowment of child i in household j.

We assume that $H_{ij}^g = H_{ij}^b = H_{ij}$, i.e. the health technology for sons and daughters in the household are the same, and that birth timing, spacing, birth order and parental inputs have the same effect on child health outcome. The gender of the child controls for any natural child health endowments that stem from being a boy or a girl.

Estimation:

In order to evaluate the effect of birth spacing on sibling health inequality at birth we compare the birth weight of sequential pairs of siblings and derive the following equation from (1):

$$\widetilde{H}_{ij} = (\gamma_a + \gamma_p)\widetilde{A}_{ij} + \gamma_g \widetilde{G}_{ij} + \gamma_h \widetilde{Z}_{ij} + \widetilde{\varepsilon}_{ij} \qquad (2)$$

In the above equation, both the dependent and independent variables are of the form $\widetilde{X}_{ij} = X_{ij} - X_{i-1j}$. Thus, health inequality is measured as the difference between the health of index child and the (i-1)th child in household j. An advantage of this form is that household heterogeneity μ_j is purged from the estimation equation. Previous empirical works have employed family fixed effects or sibling difference method to rid the least squares estimate of the birth spacing effect from the bias introduced by the unobserved household endowment (Olsen and Wolpin, 1983; Rosenzweig, 1986; Rosenzweig and Wolpin, 1988).

Although this method eliminates the household endowment component from the error term, the least squares estimate of γ_p will still be biased due to the child specific endowments ε_{ij}. The timing of the index child's birth and hence her spacing is correlated with the endowment of her older sibling (i-1), i.e. A_{ij} contained in her prior spacing (= A_{ij} – A_{i-1j}) is correlated with the ε_{i-1j} contained in $\widetilde{\varepsilon}_{ij}$.

Identification Strategy:
We employ the sex of the previous child and the number of surviving boys as instruments for prior birth spacing. These measures of son preference are valid as instruments for prior birth spacing as they have been found to be correlated with birth spacing, and are unlikely to be correlated with unobserved factors that affect sibling health inequality at birth.

In addition to gender composition we use the availability of modern methods of contraception in the community as instruments for birth spacing. The number of methods

available at various health clinics in the community will impact household birth spacing but are unlikely to be correlated with unobserved child endowments in the household.

Data:

In order to study the effect of parental fertility decisions, specifically birth spacing, on sibling inequality in birth weight, this paper employs data from the *Malaysian Family Life Survey-2* (MFLS-2) conducted in peninsular Malaysia between August 1988 and January 1989. The MFLS-2 was designed to study household decision making and gathers retrospective and current information from women and their husbands on fertility, marriage, mortality and migration.

The survey provides information on the demographic and educational attainment of the primary respondents and all the members of their household. Furthermore, household asset ownership, income and intergenerational transfers in the previous year are included. Detailed information is gathered from all MFLS-2 respondents on pregnancy history, past and current contraceptive use, menstruation history and desire for children, literacy, two longest training events, migration and dwelling changes and types of work changes.

In addition to containing information about women and their families, MFLS-2 asks community heads about the presence of different types of family planning clinics (LPP or National Family Planning Development Board clinics, Ministry of Health clinics, private clinic, Family Planning Association clinics and estate clinics) their date of inception and the services provided at the centers. The survey contains detailed information on types of contraceptives provided (pill, condoms, injections, IUDs, tubal ligation and vasectomy) and the start date for each method at each of the clinics. This allows us to get a detailed picture of the number of methods available at each of the clinics for every year since its inception, thereby providing us with information on the birth spacing options available to respondents at the time of each birth.