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Published on: 28 Jan 2015

Countries: India - Bihar, India - Central,
International

Research themes: State

Droughts and child health

Child health plays a crucial role in human capital development yet, exposure to drought in the womb increases the child's likelihood of being underweight – with knock-on effects for educational outcomes. Policies aimed at reducing child malnutrition need to start in the womb, not just after birth

Prevalence of malnourished children in India is among the highest in the world. According to the [Hunger and Malnutrition \(HUNGaMA\) Survey Report \(2011\)](#)¹ compiled and published by Naandi Foundation, 42% of children under five years of age in India are moderately or severely malnourished, a figure that is nearly double of that of Sub-Saharan Africa. Despite some progress in recent years, India is most likely going to miss the 2015 target of reducing child malnutrition to 28.6% as part of the Millennium Development Goals (MDGs).

Child health plays a crucial role in human capital development. Better nutrition and, thus, better health in early childhood improves not only health later in life, but also educational outcomes. The risk of malnutrition is especially high for children in rural areas, for children belonging to Scheduled Castes or Tribes (SC/ STs), for children from low-income families, and for children whose [mothers have less or no schooling](#). For policymakers, it is important to understand not only the consequences of poor child health but also the causes.

Child malnutrition starts early in life with low birth weight being an important risk factor that indicates impaired foetal health. An assessment of foetal development can, thus, serve as an important link in understanding one channel of child malnutrition.

“Foetal Origins Hypothesis”

The importance of foetal conditions for the development of children has been documented by numerous researchers. One of the [first to draw attention to the topic](#) was [David J. Barker](#), a British physician and epidemiologist. He proposed the “Foetal Origins Hypothesis” which claims that impaired foetal health can have long-lasting consequences as it programmes later-life health conditions.

The importance of the womb, however, is difficult to generalise given that [many studies](#) use [one-time events](#), like epidemics and famines to establish any causal relationship. Therefore, these studies do not allow drawing any conclusive policy recommendations to address the current child health situation in India. In a recent working paper, we provide [new evidence on the origins of child malnutrition](#). More precisely. we

quantify the effect of drought (periods of rainfall deficiency) experienced in the womb, on the probability of being underweight and/or anaemic, for children under age five. Since the role of weather is especially pronounced for rural population that is dependent on rain-fed agriculture, we focus on rural areas in our analysis, using the second round of the District Level Household Survey (DLHS-2), a national representative dataset. We complement a recent study by [Shah and Steinberg \(2013\)](#) who focus on educational outcomes of children at age six and older by drawing attention to the role of the foetal environment for the health of children under five.

Rainfall variability, maternal and foetal health

Rainfall shocks, specifically periods of droughts, affect maternal and foetal health through:

1. Income and food prices
2. Changes in the disease environment

The income effect negatively impacts households due to the high share of the population working directly or indirectly in the agricultural sector, and the high dependency of agriculture on rainfall. The disease environment effect can go in two directions: it can either impose a negative effect on maternal and foetal health due to a reduction in the availability of drinking water, or it can result in a positive effect through a reduction in water-borne diseases.

The overall effect of periods of drought on health is likely to be negative. Even in the presence of positive disease effects, there exists evidence pointing out that [the income effect on health dominates the disease effects](#).

To study the effects of experiencing drought in the womb, we measure rainfall in each child's district of birth, first, for the year of birth and, second, for the year before birth. Our classification of drought relies on the definition of the [Indian Meteorological Department \(2010\)](#) – a drought year is a year in which district monsoon rainfall falls below 75% of its historical average. Since we focus on deviations from the usual rainfall in a geographical area, less rain-fed districts are not classified as having a higher propensity to drought. In this sense, we argue that our rainfall shock is “exogenous”, meaning that households are unable to foresee the periods of drought and that the shock is common to the whole district population.

Assessing the impact of drought on child health

We estimate the impact of drought experienced in the womb on children's weight and prevalence of anaemia, controlling for the child's gender, age, caste, parental education, religion, poverty, birth order and quarter of birth. We find that exposure to drought before birth increases the child's probability of being underweight and severely underweight by 1.7 and 2.1 percentage points respectively. Yet, the association of drought with anaemia is not statistically significant. Moreover, we show that a drought in the first year of life is equally important. Children that experience drought after birth are more likely to suffer from moderate and severe under-nutrition than children

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We estimate a slightly higher effect of drought for low-caste children compared to high-caste children, and for boys compared to girls (this is consistent with findings in the medical and biological literature that boys are more vulnerable in the womb). However, none of these differences are statistically significant.

We rule out that our results are driven by a general diversity across districts, through differences in adopted health policies, agricultural, and economic conditions that may also be related to child health. Moreover, we show that our main findings are not subject to the way we define drought. Likewise, droughts two or three years before birth are unrelated to the prevalence of underweight, meaning that any foetal effect should only be found for rainfall shocks in the year before birth or, put another way, for shocks that actually occurred during the foetal period.

Weather shocks account for one of the many risk factors for child malnutrition in India. Having established the strong long-lasting role of early life shocks on child malnutrition is an important starting point for policies that target child health. Any effort towards improving child health needs to start at the beginning of human life, namely in the womb.

Note:

1. As defined by the World Health Organization (WHO), moderate and severe malnutrition (also referred to as under-nutrition) is defined as having a weight-for-age z-score below -2 and -3, respectively. Weight-for-age is a standardised measure that compares a child's weight with that of healthy children of the same age, living under conditions likely to favour achievement of their full genetic growth potential. In other words, weight-for-age captures how much a child's weight deviates from an international standard of healthy children at the same age.