

Knowledge Brief

Health, Nutrition and Population Global Practice

EARLY CHILDBIRTH AND UNDER-FIVE MORTALITY IN NEPAL

Adenike Onagoruwa and Quentin Wodon

June 2017



Child Marriage Series with Education Global Practice

KEY MESSAGES:

- In Nepal, about one in nineteen children die before the age of five; for children born of mothers younger than 18, the risk is higher.
- Controlling for socio-economic and other characteristics, being born of a mother younger than 18 does not lead to a statistically significant increase in the risk of under-five mortality as compared to otherwise similar children born of older mothers.

Early childbirth is associated with health risks for children, including under-five mortality. This could be in part because young mothers often come from disadvantaged groups. But the age of the mothers may also play a role.

Children of young mothers are at higher risk of morbidity and under-five mortality.

Young mothers often come from disadvantaged socio-economic backgrounds and early childbirths are more common in poor areas where prenatal care is limited and access to health facilities may be an issue. Girls who have children early also tend to be less educated and may suffer from lack of agency within the household, further reducing access to care. In addition, some girls who give birth early may not yet be ready physiologically to give birth. The risk of obstetric fistula, for example, is higher for young mothers. These various factors lead to higher risks of under-five mortality for children born of young mothers. How large is the impact of early childbirth on under-five mortality? Does early childbirth accounts for a large share of under-five deaths? These are the questions asked in this brief for Nepal.

Box 1: Brief and Series Primer

How is early childbirth defined? Early childbirth is defined in this brief as a child being born of a mother younger than 18. Early childbearing is related to the practice of child marriage.

Why a series on child marriage? Child marriage has significant negative impacts – not only for girls, but also for a range of development outcomes. Demonstrating these impacts will assist governments and others to make the case for intervening to reduce the practice.

What are the topics discussed in the series? The series looks at the impacts of child marriage on health, population, education, employment, agency, and violence, among other outcomes. The welfare, budget, and non-monetary costs of child marriage are estimated. Legal/institutional aspects and options to reduce the practice are also discussed.

What is the question asked in this brief? The question is: How large is the impact of early childbirth on under-five mortality and does it account for a large share of under-five deaths?

How is the question answered? Econometric analysis of Demographic and Health Survey data is used to estimate the impact of early childbirth on under-five mortality.

Statistically, children from young mothers are two percentage points more likely to die before five.

The analysis is based on data from the 2011 Demographic and Health Survey for Nepal. According to the survey, one in nineteen children die before the age of five (5.4%). This represents a decline over time, since the rate observed with the 2003 DHS was 6.1% and the rate with the 2001 DHS was 9.1%. (Ministry of Health and Population (MOHP) [Nepal], New ERA, and ICF International Inc. 2012).

In this brief we focus on whether all children identified in the survey have died or not before reaching five years of age, and the factors that affect that outcome. This implies relying on statistics computed in a different way from the official under-five mortality rate, but the idea and orders of magnitude are similar (to avoid a risk of confusion, we will use below the term “under-five mortality” but not the term “under-five mortality rate”). As shown in table 1, 6.88 percent of children born of mothers younger than 18 die before reaching five years of age. The proportion, which we refer to as under-five mortality, is 4.59 percent for children born of mothers 18 to 34 years of age. For children of older mothers (35 and older), the under-five mortality is at 3.30 percent.

Table 1: Under-five Mortality by Age of the Mother

Age of the mother	Under-five Mortality (%)
Mother younger than 18	6.88
Mother in 18-34 age bracket	4.59
Mother older than 35	3.30

Source: Authors.

Controlling for other factors, early childbirth does not increase the likelihood of under-five mortality substantially.

The difference in under-five mortality between children of young and older mothers does not necessarily imply a causal effect of the age at delivery, but it does suggest that early childbirth may contribute to under-five mortality. To check whether controlling for other factors early childbirth is indeed associated at the margin with higher under-five mortality, regression analysis is used (see the annex for details on the methodology).

Table 2 provides key results with baseline and extended models. The interpretation of the coefficients is in terms of marginal impacts in percentage terms. For example, a statistically significant coefficient of 0.05 for a mother younger than 18 would indicate that children of very young mothers have a likelihood of under-five mortality five percentage points higher than children of older mothers, controlling for other characteristics. With the baseline specification, table 2 indicates that deliveries at a young age do not significantly increase the likelihood of under-five mortality for the children in comparison to a

delivery at 18 to 34 years of age (in Nepal). The difference in risk of under-five mortality between mothers ages 18-34 and mothers above 35 is also not statistically significant.

In Nepal, delivery at a young age does not increase the likelihood of under-five mortality for the child in comparison to a delivery at 18 to 34 years of age.

Marginal effects do not change much when additional controls are used (extended model). There is thus some evidence that in the case of Nepal, after controlling for a wide range of other variables, early childbirth may not contribute to under-five mortality, but prudence remains needed when interpreting the results given the risk of omitted variable bias (box 2).

Table 2: Impact of Early Childbirth on Under-five Mortality

Age at first marriage	Baseline model	Extended model
Mother younger than 18	0.0201	0.0209
Mother in 18-34 age bracket	Reference	Reference
Mother older than 35	-0.00824	-0.00823

Source: Authors.

Levels of statistical significance: *** 1%, ** 5%, * 10%.

Box 2: Risk of Omitted Variable Bias

In many countries, early childbirth appears to be positively correlated with the risk of under-five mortality after controlling for other factors that may also contribute to mortality. This could indicate a causal effect. However, other variables correlated with both early childbirth and under-five mortality not included in the analysis could be at the source of the correlation between early childbirth and under-five mortality. Because of the risk of omitted variable bias, the results cannot be considered as fully conclusive regarding a causal effect of early childbirth on under-five mortality.

A number of results from the regression analysis not shown in table 2 are worth mentioning. The impact of the education of the mother on the likelihood of under-five mortality is not statistically significant. Similarly, the impact of wealth on the likelihood of stunting is not statistically significant, at least when measured through wealth quintiles. This is a bit surprising, but it could be due to the fact that households in the bottom quintiles are poor or near poor in a country like Nepal, whether a household is extremely poor or simply poor may not make much of a difference on the likelihood that the child may die. A few other effects are also statistically significant, as discussed in the more detailed study on which the brief is based.

While the direct impact of early childbirth on under-five mortality is not statistically significant in Nepal, the inclusion of other independent variables as controls points to the possibility of indirect effects of early childbirth on

under-five mortality. Because early childbirth may have an impact on other variables used as controls in the regression, its overall effect on under-five mortality, including indirect effects through these other variables, may be larger than the (non-significant) direct effect documented in table 2. For example, for some of the girls delivering a baby at a young age, early pregnancy may have a negative effect on education enrollment and attainment, which through the impact of education attainment on under-five mortality would lead to an indirect effect of early childbirth on under-five mortality. In addition, early deliveries, by increasing the number of children that women have, may also contribute to lower labor force participation for women and thereby lower household wealth, and in some countries higher under-five mortality (although for Nepal, wealth effects are again not statistically significant).

Early childbirth may also affect under-five mortality indirectly, for example through lower education attainment for mothers, but these effects are likely to be smaller.

Simulations suggest that very few deaths among children under five are directly or indirectly due to early childbirth.

The last step in the analysis of the impact of early pregnancy and delivery on under-five mortality consists in assessing the potential reduction in under-five mortality that could arise from eliminating early pregnancies and deliveries. This can be done by predicting (i.e. simulating) the likelihood that children who were born of mothers younger than 18 would have remained alive if they had been born of older mothers. In other words, we are considering the direct effects of the age of the mother on under-five mortality, shifting in the data deliveries by young mothers to deliveries at a later age, and observing the difference that this makes for under-five mortality nationally. In the case of Nepal, because the effect of early childbirth on under-five mortality is not statistically significant, direct effects are not (statistically speaking) present.

Conclusion

Early pregnancy and delivery may contribute to the risk of under-five mortality for children, directly, or indirectly. This brief has provided estimates of the direct impact of early childbirth on under-five mortality in Nepal using the latest DHS survey. About one in nineteen children under the age of five die; but for children born of mothers younger than 18, the risk of under-five mortality is higher by 2.3 percentage points than the risk for children of older mothers.

Because only a small share of deliveries are by mothers younger than 18, very few children deaths before five can be said to be directly due to early childbirth.

Controlling for socio-economic and other characteristics, being born of a mother younger than 18 does not have a statistically significant effect on under-five mortality as compared to otherwise similar children born of older mothers. This, together with non-significant indirect effects of early childbirth through education and wealth in Nepal, suggests that few children die directly or indirectly because of an early childbirth, even though some may.

References

- Bicego, G., & Ahmad, O. (1996). Infant and child mortality, Demographic and health surveys comparative studies No. 20. *Calverton (Maryland): Macro International Inc.*
- Ministry of Health and Population (MOHP) [Nepal], New ERA, and ICF International Inc. 2012. *Nepal Demographic and Health Survey 2011*. Kathmandu, Nepal: Ministry of Health and Population, New ERA, and ICF International, Calverton, Maryland..
- Nasrullah, M., Zakar, R., Zakar, M. Z., & Krämer, A. (2014). Girl-child marriage and its association with morbidity and mortality of children under 5 years of age in a nationally-representative sample of Pakistan. *The Journal of pediatrics*, 164(3), 639-646.
- Prakash, R., Singh, A., Pathak, P. K., & Parasuraman, S. (2011). Early marriage, poor reproductive health status of mother and child well-being in India. *Journal of family planning and reproductive health care*, jfprhc80.
- Raj, A., Saggurti, N., Winter, M., Labonte, A., Decker, M. R., Balaiah, D., & Silverman, J. G. (2010). The effect of maternal child marriage on morbidity and mortality of children under 5 in India: cross sectional study of a nationally representative sample. *BMJ*, 340.
- Raj, A., & Boehmer, U. (2013). Girl child marriage and its association with national rates of HIV, maternal health, and infant mortality across 97 countries. *Violence against women*, 19(4), 536-551.
- Raj, A., McDougal, L., & Rusch, M. L. (2014). Effects of young maternal age and short interpregnancy interval on infant mortality in South Asia. *International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics*, 124(1), 86.

Annex: Methodological Note

There is an existing literature on the relationship between early pregnancy (as well as child marriage) and the risks of infant, child, and under-five mortality. Much of the literature focuses on South Asia (e.g., Bicego, 1996; Adhikari, 2003; Raj, 2010; Raj et al., 2013; Raj and Boehmer, 2013; Prakash et al., 2011; Nasrullah et al., 2014). The results suggest that children born of young mothers are indeed at higher risk of under-five mortality.

Statistics comparing under-five mortality according to the age of the mother may hint at the relationship between the two. But for assessing marginal impacts, regression analysis is needed. Part of the literature relies on survival models, which provide information on how long children survive given their characteristics. The models are censored, in that if a child has survived beyond five years of age, s/he is considered as having avoided under-five mortality. One may also rely on simpler logit or probit models to analyze under-five mortality. In this case, the focus is on whether the child has survived, or not, as opposed to how long the child has survived. Given the focus in this brief on the contribution of early pregnancies and deliveries to under-five mortality, results from the probit regressions will be presented, as they provide a simple way to provide those estimates.

Different specifications are estimated to assess the robustness of the results to changes in the econometric models. Overall, the main results are robust to different specifications. For the baseline model, the independent variables are: (1) the age of the mother at the time of delivery by categories; (2) the child's gender; (3) whether the child had siblings born at the same time (multiple birth); (4) the birth order of the child and the child's birth weight by categories; (5) the length of time between the child's birth and a previous birth for the mother; (6) whether the delivery took place in a health facility; (7) the location of the child by region and by urban-rural category; (8) the education of the mother; (9) whether the household has access to an improved water source and improved sanitation; (10) the wealth quintile of the household; (11) whether the household practices polygyny; and finally (12) indicators of decision-making power for the mother in the household.

It is worth noting that the specifications used for modeling the correlates of under-five mortality are more parsimonious in terms of the independent variables included than the specifications used in a separate analysis by the authors for malnutrition using stunting as the main measure of interest. In principle, given that malnutrition is a key factor leading to premature death for children, one could argue that all correlates of under-five malnutrition should also be used as correlates of under-five mortality. The issue however is that the rate of under-five mortality in countries is much smaller than the rate of stunting. The models used tend to perform less well when very few of the observations take on a positive value for the dependent variable (i.e., dying before the age of five). In addition, when many more variables are used, there is also a much higher risk of perfect correlation (prediction) between some of the variables and the dependent variable, in which case the independent variable will be dropped from the model as well as the observations for which the outcome was perfectly predicted. This calls for being somewhat parsimonious in the specifications.

In addition to what is often done in the literature, this brief also assesses the potential reduction in under-five mortality that could arise from eliminating early pregnancies and deliveries, or, said differently, the share of deaths for children under five that can be attributed to early childbirth according to the results. Finally, in term of interpretation, it is important to mention the risk of omitted variables bias, as noted in Box 3 of the brief.

This brief was produced by a World Bank team as part of the Economic Impacts of Child Marriage study. The synthesis report under the study was produced jointly with the International Center for Research on Women. The study benefitted from support from the Bill & Melinda Gates Foundation, the Children's Investment Fund Foundation, and the Global Partnership for Education. Comments from colleagues and peer reviewers are gratefully acknowledged. The opinions expressed in this brief are those of the authors only and need not reflect the views of the World Bank, its Executive Directors, or the countries they represent.



The Health, Nutrition and Population Knowledge Briefs of the World Bank are a quick reference on the essentials of specific HNP-related topics summarizing new findings and information. These may highlight an issue and key interventions proven to be effective in improving health, or disseminate new findings and lessons learned from the regions. For more information on this topic, go to: www.worldbank.org/health.