Knowledge Brief

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EARLY CHILDBIRTH AND UNDER-FIVE MALNUTRITION IN MALI

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Child Marriage Series with Education Global Practice

KEY MESSAGES:

- In Mali, more than three in ten children under the age of five are stunted; but for children born of mothers younger than 18, the risk of stunting is higher.
- Controlling for socio-economic and other characteristics, being born of a mother younger than 18 increases the likelihood of stunting for children under-five by ten percentage points in the baseline model, as compared to otherwise similar children born of older mothers.

Nearly one-fifth of under-five deaths could be prevented with optimal feeding. Poor nutrition at a young age may also have irremediable consequences for brain development, cognitive skills, and productivity in adult life.

Malnutrition has severe consequences for children.

Poor nutrition weakens children's immune systems, putting them at a greater risk of falling sick from preventable illnesses such as pneumonia and diarrhea. According to Horton et al. (2008), nearly one-fifth of under-five deaths in the world could be prevented with optimal feeding. Research also suggests that poor nutrition at a young age may have irremediable consequences for brain development, cognitive skills, and ultimately productivity in adult life. Unfortunately, a large share of children in the developing world are malnourished. The question considered in this brief is whether early childbirth (defined as a child being born of a mother younger than 18), which in many countries is the result of child marriage, contributes to under-five malnutrition in a significant way in Mali. The brief is part of a series of similar standardized country-specific briefs on the same topic for a number of countries.

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 often 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: What is the impact at the margin of an early childbirth on the probability of malnutrition (stunting) for children under-five years of age?

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

Statistically, children from young mothers are eleven percentage points more likely to be stunted than if the mother is between 18 and 34 years of age.

The focus in this brief is on stunting as a measure of persistent exposure to malnutrition with potentially severe long-term consequences throughout a person's life (see box 2 on indicators used to measure malnutrition). The analysis is based on data from the 2012-13 Demographic and Health Survey for Mali. Estimates suggest that 48.09 percent of children born of mothers younger than 18 are stunted. The proportion is still high, but eleven points lower at 37.40 percent for children born of mothers 18 to 34 years of age. The difference in stunting rate between these two age groups is statistically significant. For children of mothers older than 35, the incidence of stunting was still lower at 38.43 percent.

Table 1: Incidence of Stunting by Age of the Mother

Age of the mother	Stunting (%)
Mother younger than 18	48.09
Mother in 18-34 age bracket	37.40
Mother older than 35	38.43

Source: Authors.

Box 2: Measures of Malnutrition

Three main measures of malnutrition are used in applied work. A child is considered underweight if s/he has a weight more than two standard deviations below the reference median weight for the child's age. A child is considered wasted if s/he has a weight to height ratio more than two standard deviations below the median weight for height for the reference population. A child is considered stunted if s/he has a height more than two standard deviations below the median reference height for that age. If a child on any of these measures is below three standard deviations of the norm, s/he is considered as severely underweight, wasted, or stunted. Among the three measures, stunting and wasting tend to be used the most. Stunting often results from persistent insufficient nutrient intake and infections. It may lead to delayed motor development and poor cognitive skills that can affect school performance as well as productivity and earnings later in life. Wasting tends to result more from acute food shortage or disease and may lead to death. For the purpose of this brief, given a separate brief of under-five mortality, stunting is the best measure to focus on.

Controlling for other factors, early childbirth still increases the likelihood of stunting substantially.

The difference in the likelihood of stunting 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 stunting. To check whether controlling for other factors early childbirth is indeed associated at the margin with higher under-five malnutrition, 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 stunting five percentage points higher than otherwise similar children of older mothers.

With the baseline specification, table 2 suggests that deliveries at a young age increase the likelihood of stunting for the children by 10.3 percentage points in comparison to a delivery at 18 to 34 years of age (coefficient statistically significant at the one percent level). The difference in risk of stunting between mothers ages 18-34 and mothers above 35 is not statistically significant.

Deliveries at a young age may increase the likelihood of stunting for the children by 10.3 percentage points in comparison to a delivery at 18 to 34 years of age.

Marginal effects do not change much when additional controls are added (extended model). There is thus some evidence that after controlling for a wide range of other variables, early childbirth may contribute to stunting, but prudence remains needed when interpreting these results given the risk of omitted variable bias (see box 3).

Table 2: Impact of Early Childbirth on Stunting

Age at first marriage	Baseline model	Extended model
Mother younger than 18	0.103***	0.0914**
Mother in 18-34 age bracket	Reference	Reference
Mother older than 35	0.0101	0.00783

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

Box 3: Risk of Omitted Variable Bias

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

A number of results from the regression analysis not shown in table 2 are worth mentioning. The impact of wealth on the likelihood of stunting is statistically significant in the two highest wealth quintiles. For example, children in the highest quintile (the richest 20% of households) have a likelihood of stunting fifteen percentage points lower than children in the poorest 20% of households. This is not surprising, and could be due to the fact that households in the bottom quintiles are poor or near poor in a country like Mali. Given that the incidence of stunting is so high, whether a household is extremely poor, or simply poor,

does not make much of a difference on the likelihood that children will be stunted.

As shown in table 3, the marginal impact of a mother having a secondary education or better on the likelihood that her child will be stunted is not statistically significant, which is somewhat surprising.

Note though more generally that the inclusion of education as a control points to the possibility of indirect effects of early childbirth on stunting. Because early childbirth may have an impact on other variables used as controls in the regression, its overall effect on stunting, including indirect effects through these other variables, may be larger than the direct effect documented in table 2. For example, for some girls having a baby at a young age, early childbirth could have reduced education attainment, which could lead to a higher risk of stunting (although not in Mali according to the regression results). In addition, early deliveries, by increasing the number of household members may also contribute to lower standards of living. In Mali, as mentioned earlier, the regression results suggest that the level of welfare as measured through wealth quintiles have an effect on stunting. Still, in terms of magnitude, those indirect effects are likely to be small in comparison to the direct effects in table 2.

Early childbirth may affect under-five malnutrition through lower education attainment for mothers or lower socio-economic status, but these effects are likely to be smaller.

Table 3: Impact of the Mother's Education on Stunting

Age at first marriage	Baseline model	Extended model
No education or below primary	Reference	Reference
Primary education	-0.00600	-0.00637
Secondary education or higher	0.0177	0.0153

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

Overall, the results suggest that as a first order approximation, one may rely on the estimated direct effects of early childbirth on stunting when simulating the impact of the elimination of early childbirth on malnutrition in the country. Doing so does likely entail underestimation of the overall effects, but probably not by a wide margin.

Simulations suggest that about two in 100 stunted children is stunted directly due to early childbirth.

The last step in the analysis consists in assessing the potential impact of eliminating early childbirth on stunting. This is done by predicting (i.e. simulating) the likelihood that children who were born of mothers younger than 18 would have been stunted if they had been born of older mothers. In other words, we are considering the direct effects of the age of the mother on stunting, shifting in the data deliveries by young mothers to deliveries at a later age, and observing the difference that this makes for stunting rates nationally. The simulations suggest that without early deliveries, the share of children stunted could decrease by about 0.7 percentage points. This corresponds (roughly) to the product of the marginal effect of early deliveries on stunting (0.091 in table 2) times the share of children born of mothers younger than 18 (eight percent of children). Given the rate of stunting nationally, two in 100 stunted children could be considered as stunted due to the direct effect of early childbirth on the likelihood of stunting. This may appear low in comparison to the total number of children who are stunted, but still represents a large number of children.

Because only a small share of deliveries are by mothers younger than 18, only two in 100 stunted children can be said to be stunted directly due to early childbirth.

Conclusion

Early childbirth contributes to the risk of malnutrition for children, directly and indirectly. This brief has provided estimates of the direct impact of early childbirth on stunting in Mali using the latest DHS survey. More than three in ten children under the age of five are stunted. For children born of mothers younger than 18, the risk of stunting is higher by eleven percentage points. Controlling for socio-economic and other characteristics, being born of a mother younger than 18 appears to increase the likelihood of stunting by nine percentage points versus children born of older mothers. Given the share of children born of mothers younger than 18, nationally for every 100 stunted children, at least two could be stunted directly because of early childbirth. This may appear low, but still represents a large number of children.

References

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Annex: Methodological Note

There is an existing literature on the relationships between early childbirth, child marriage, and the risks of under-five malnutrition (e.g., Fall et al., 2015, and Finlay et al. 2011). This literature suggests that children born of young mothers are at higher risk of malnutrition. How much higher in the case of Niger is the question to be answered. To answer this question, this brief focuses on stunting as the measure that tends to best capture persistent exposure to malnutrition with likely long term negative consequences for children.

There is no doubt that children born to very young mothers are more likely to be malnourished than other children, but this might not specifically be due to the fact that the mothers are young. Girls who have children before the age of 18 tend to be poorer. This implies that their children are at higher risk of inadequate nutritional intake. Early pregnancies are more common in areas where access to healthcare is limited to prevent or treat malnutrition. Young girls also often suffer from a lack of agency and decision-making power in the household, which may reduce their ability to seek care for their children when needed. Girls who give birth early are likely to have dropped out of school due to pregnancy or marriage, which may also affects the nutritional status of their children due to lack of education or knowledge on how to best take care of young children.

These risk factors correlated with early childbirth do not necessarily imply that early pregnancies by themselves contribute in a direct way to child malnutrition. Controlling for other factors, it could be that early childbirth does not lead to a higher risk of malnutrition for children. But it could also be that there is a direct causal link between early childbirth and child malnutrition, for example if some young mothers giving birth are not yet be ready physiologically to give birth, which could in turn affect the health of their children. This brief estimates the direct impact of early childbirth on under-five malnutrition.

In addition, the brief provides an assessment of the extent to which under-five malnutrition would be reduced if early pregnancies/deliveries were eliminated. In order to measure the potential impact of early childbirth at the margin on stunting for children under the age of five, regression analysis is used. In the more detailed paper on which this brief is based, both tobit regressions (to measure the degree of stunting among children who are stunted) and probit regressions (to measure the likelihood of stunting) are provided.

In this brief, due to space constraints and because of the interest in the share of stunting that could be attributed to early childbirth, the focus is on reporting results from probit regressions. In those regressions, the dependent variable is whether a child is stunted or not.

Different specifications are estimated to assess the robustness of the results to the choice of models. Overall, the results are fairly robust to different specifications. For the baseline model, the independent variables are the following: (1) the age of the mother at the time of delivery by categories; (2) the child's age and 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 child has received recommended immunizations; (7) whether the delivery took place in a health facility and was attended by skilled personnel; (8) the mother's height and education level, as well as whether she works and the type of work involved; (9) the father's occupation and his level of education; (10) the location of the child by region and by urban-rural category; (11) whether the household has access to an improved water source and improved sanitation; (12) whether the household has more than two children under-five; and finally (13) the wealth quintile of the household.

In the extended model, additional controls are added: (14) whether the household practices polygyny; (15) whether the distance to health facility is a major problem for the household; (16) the age gap between the spouses; (17) indicators of decision-making power for the mother; (19) tolerance towards wife beating; and (20) whether the mother is able to get permission to access healthcare.

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The economic impacts of child marriage