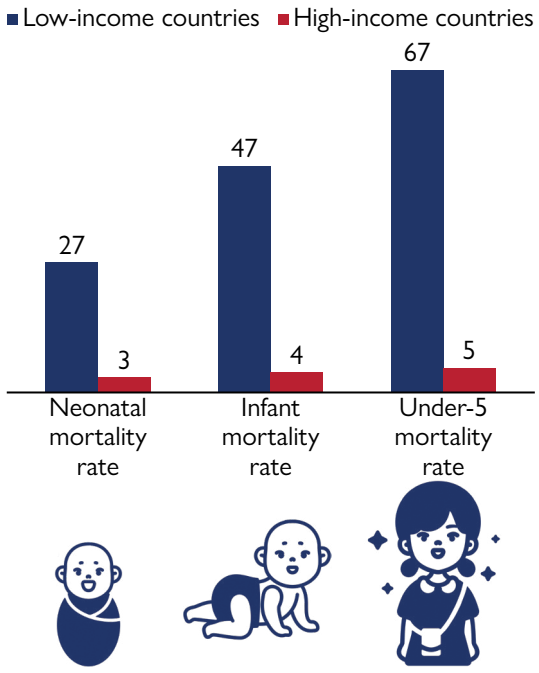
The Effect of Fertility Behavior on Child Survival: Evidence from the Demographic and Health Surveys (AS88)

An Analysis Brief from The DHS Program

Why study risk factors of childhood mortality?

Globally, childhood mortality rates have been declining steadily over the past three decades. The neonatal mortality rate has decreased from 37 deaths per 1,000 live births to 18 deaths per 1,000 live births. Still, the neonatal mortality rate is nine times higher among low-income countries compared to high-income countries. The Sustainable Development Goal (SDG) target 3.2 aims to end preventable deaths of children under 5 years by 2030.

Figure 1. *Global childhood mortality rates (World Bank, 2021).*



Several studies conducted by The DHS Program show that birth spacing (the amount of time, or interval, between births) is an important factor associated with infant and child mortality. With over 3.7 million births from 84 surveys, this is the fourth and largest analysis, and builds on previous work using recent DHS survey data to explore three risk factors of childhood mortality: birth intervals, mother's age at birth, and birth order. Previous studies were published in 2005, 2008, and 2014.

Which countries were included in the study?

Data for this study come from 84 surveys conducted between 2012 and 2022 in 56 countries in Sub-Saharan Africa, West Asia, South and Southeast Asia, and Latin America and the Caribbean.

What methods were used to conduct this analysis?

The outcome for this study is childhood mortality, which is split into six different outcomes by age group. These are:

- **Early neonatal mortality (ENN)** deaths at 0–6 days after live birth
- **Neonatal mortality (NN)** deaths within the first 30 days among all children born alive
- **Post–neonatal mortality (PNN)** deaths at age 1–11 months after live birth
- **Infant mortality** deaths at age 0–11 months among all children born alive
- **Child mortality** deaths at age 12-59 months among children who survive to age 1 year
- **Under–5 mortality** deaths at age 0–59 months among all children born alive

This study examines the relationship between childhood mortality and three key risk factors: birth interval, mother's age at birth, and birth order. Each variable has high-risk categories for types of births known to be associated with higher rates of childhood mortality:

- Birth interval: under 24 months from prior birth to pregnancy and 24-35 months
- Maternal age at birth: under 18 and over 40
- Birth order: first birth and birth order of 4 or higher.

A birth could have no, 1, 2, or 3 risks. For example, a birth could have a birth interval of under 24 months (high-risk), a maternal age of 32 (normal risk), and a birth order of 4 (high-risk), which would mean that birth has two risks. There are 21 combinations of "risk groups" forming 21 categories of risk.

This study explores summary statistics, bivariate, and multivariate analysis for the 21 categories of risk, as well as simplified groups for births with no risk, unavoidable first births (all birth risks in this study are avoidable except that every mother must have a first birth), and single, double, and triple risk births. Data from all included surveys were pooled into one dataset to allow for better estimation of mortality risks. In multivariate analysis, background characteristics that may influence child mortality such as sex of the child and mother's education level are included as control variables.

What are the key results?

- **Only 17% of births in the pooled dataset had no risk factors.** One in four births had double risks and less than 1% had 3 risk factors (see Figure 2).
- **Short birth intervals are associated with increased risk of mortality for all age groups.** Compared to children conceived three to four years after their next oldest sibling was born (reference group of 36-47 months in Figure 3), children conceived within 6 months of the birth of their next oldest sibling are 2.5 times more likely to die in the first week of life (early neonatal mortality) and 3.6 times more likely to die before their fifth birthday (under-5 mortality).

Figure 2. *Distribution of births 0 to 179 months prior to survey by maternal fertility related risk factors, 84 DHS surveys, 2012 to 2022.*

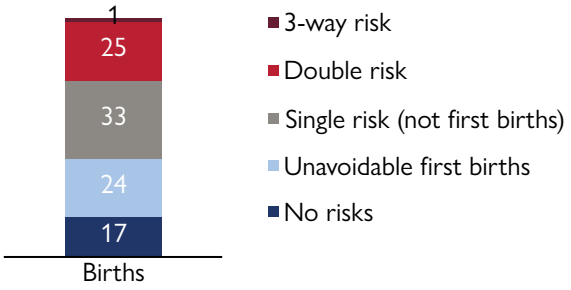
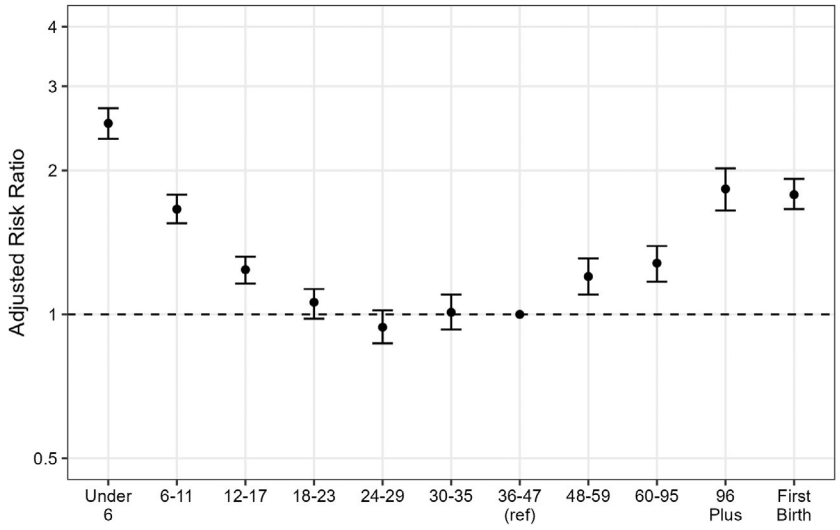


Figure 3. *Relative risk of neonatal mortality by birth interval. Children with short birth intervals and long birth intervals (of 48 months or more) have greater risk of dying in the first week of life than do children conceived 36-47 months after the birth of their next oldest sibling (the reference group).*



- **First born children have a higher risk of all measures of childhood mortality** except child mortality (deaths between ages 1 and 5) than children who were conceived three to four years after their next oldest sibling. This suggests the risk of being born first is focused in the first year of life.
- **Children born to mothers under age 18 and over age 40 have an increased risk of all measures of childhood mortality,** compared to children born to mothers age 18 to 24.
- **In general, children born with 2 or 3 risks are more likely to die than children with a single risk or none.** Children with the double risk of being conceived within 24 months of the birth of their next oldest sibling and who are born to a woman age 40 or older is the group with the highest risk of early neonatal mortality (death in the first week of life). These children were 4.1 times more likely to die in their first week than children with no extra risks.
- **The frequency of short birth intervals and births to women under age 18 has declined** since the previous study, which may have contributed to observed declines in infant mortality in recent years.

What does this mean?

The findings of this study reinforce those of previous studies in this series. Short intervals between births, first births, higher order births, and births to younger and older women are risk factors for childhood mortality. To achieve SDG target 3.2 to reduce childhood mortality, policies and programs should be developed to address these specific fertility risks.

The R code used in this study is available for free to anyone who seeks to replicate or extend these results and can be found online on The DHS Program Code Share Library on GitHub.

This brief summarizes The DHS Program's Analytical Studies 88 by Kristin Bietsch and Rebecca Rosenberg with funding from The United States Agency for International Development through The DHS Program implemented by ICF. The full report is available at: https://dhsprogram.com/publications/publication-as88-analytical-studies.cfm.