Frameworks for studying the determinants of child survival

Kenneth Hill

The early 1980s was a period of great optimism about child survival in high mortality developing countries and a time when much research activity was generated. The principle of primary health care, defined as essential health care based on practical, scientifically sound and socially acceptable methods and technology made universally accessible at an affordable cost, had been endorsed by the Declaration of Alma-Ata in September 1978. An increasing body of research showed that some low-income countries had succeeded in achieving low child mortality (1, 2). New technologies made it possible to prevent major infectious diseases of childhood through mass immunization campaigns and to treat diarrhoeal dehydration and malaria at low cost. International aid agencies pushed an agenda of a limited number of inexpensive, highly effective interventions to reduce child mortality in low income countries.

Henry Mosley and Lincoln Chen argued in their influential and widely cited 1984 article (3) that research efforts to identify the most cost-effective uses for health sector resources were hampered by the lack of clear conceptual models for the study of child health. In particular, they noted a disparity between social science research, which focused largely on the roles of socioeconomic and cultural factors in child deaths, and medical research, which focused on specific disease processes and used morbidity as the most common outcome variable. The objective of their paper was to develop an analytic framework that would integrate the two research methodologies, and to introduce a single outcome variable that combined both mortality and morbidity. The conceptual core of their framework was the idea that all background (socioeconomic and cultural) variables have to operate through a limited set of proximate determinants that directly influence the risk of disease and the outcome of disease processes.

The idea of a proximate determinants (or intermediate variables) analytic framework was first introduced by Davis & Blake (4) for the study of fertility. They argued that any social factors influencing the level of fertility had to operate through one or more of three groups of a total of 11 “intermediate variables,” the three groups being exposure to sexual intercourse; risk of conception given sexual intercourse; and likelihood of a live birth given conception. The appeal of the analytic framework was that, whereas a particular social factor might influence more than one intermediate variable, and could thus either increase or decrease fertility, a change in an intermediate variable was a necessary and sufficient condition for a fertility change in an unambiguous direction. Research could therefore focus on the associations between background factors and individual intermediate variables, since by definition the intermediate variables were causally related to reproduction.

Mosley & Chen note that the problems raised by mortality analysis are far more complex than those posed by the analysis of fertility, since “… a child’s death is the ultimate consequence of a cumulative series of biological insults rather than the outcome of a single biological event” (p. 29) As a result, they developed what is perhaps the least used part of their framework: a single outcome variable combining both child death and child health status, represented by weight-for-age. They argue that both child mortality and child growth are affected by the same set of underlying nutritional and infectious conditions, such that weight-for-age can be regarded as a measure of health status rather than solely of nutritional status. They thus define five health status categories using the Gomez classification (5): healthy (90% or higher of standard weight-for-age); Grade I (75–89% of standard); Grade II (60–74% of standard); Grade III (below 60% of standard); and dead. This index of health status has the great advantage of providing many more observations than a dichotomous alive/dead outcome; it lends itself to ordered analytical techniques, and has not received the attention it deserves.

Mosley & Chen’s analytical framework is conceptually identical to that of Davis & Blake (4). Background social, economic, cultural, and health system variables influence a parsimonious but exhaustive set of proximate determinants which in turn directly influence the single outcome variable just described. The authors define five categories of a total of 14 proximate determinants: maternal factors (age, parity, birth interval); environmental contamination (air, food/water/fingers, skin/soil/inanimate objects, insect vectors); nutrient deficiency (calories, protein, micronutrients); injury (acciden-
References