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Abstract

A central proposition of demographic transition theory is that declines in infant and child mortality can encourage subsequent declines in fertility. Even the earliest formulations of the theory recognized that fertility decline would occur only with a lag, but neither theory nor empirical work has explored the length of such lags. This paper urges that individual perceptions and beliefs about mortality risks, conspicuously absent from the demographic research agenda, be studied directly. It proceeds to link mortality perceptions to health care decisionmaking and investments in children.

The paper concludes by calling for a new agenda on mortality decline. This agenda would focus on three main themes: individual perceptions of health levels and trends, including mortality risks, with the concept of social learning being prominent; the overlap of modern and traditional health care systems and the associated beliefs, with an emphasis on the perceived efficacy of modern modes of prevention and treatment; and the role played by perceived mortality risks and health in affecting parental investments in schooling, with attention to adult as well as to child mortality and health.

These issues can be studied profitably in high-mortality settings as well as in settings of moderate mortality risk.

Over the past twenty years, a time span bracketed by the publication of the landmark Preston (1978) volume and the confirmation by Montgomery and Cohen (1998) of its central conclusions, much has been learned about mortality decline and fertility transition. The empirical record for developing countries is now richer and better documented than was true two decades ago; so, too, is the historical record for European and some non-European societies. The methods used to detect the causal contribution of mortality have been refined; the confounding effects of reverse causation, by which fertility decline can affect mortality, have become better understood; and notable progress has been made in clarifying the dynamic theory. Surely, with all these advances, no important question can have been left unresolved.

Considerable progress has indeed been made, but in some respects the new data and new methods have done no more than bring glaring research gaps into view. In this last year of the twentieth century, with so many countries nearing the end of their fertility transitions, it might be thought a bit late to advance a new agenda on mortality decline. Nevertheless, a new agenda is warranted, and its priority items might be as usefully pursued in countries with moderate levels of mortality as in those with high mortality.

This agenda would focus on three main themes:

- individual perceptions of health levels and trends, including mortality risks, with the concept of social learning being prominent;
- the overlap of modern and traditional health care systems and the associated beliefs, with an emphasis on the perceived efficacy of modern modes of prevention and treatment;
- the role played by perceived mortality risks and health in affecting parental investments in schooling, with attention to adult as well as to child mortality and health.

The first two items are unexplored aspects of the “insurance” or “hoarding” effect, by which parental expectations of child loss cause fertility to be higher than if survival were assured. Preston succinctly described the effect in his 1978

volume; Sah (1991) and Wolpin (1998) later exposed its conceptual roots in precise mathematical formulations. Yet, very few demographic studies, whether qualitative or quantitative, have examined the subjective meaning of the effect, assessed alternative measures, or pursued its links to health care decisionmaking. The third agenda item above connects changing perceptions of mortality to parental motivations for human capital investment. Few economists now question the importance of human capital accumulation to economic development, but as Preston (1980) noted, the contribution of mortality decline to such accumulation remains ill defined.

The current literature on mortality effects is marked by an interesting disjuncture between the implications of macro-level time-series studies and the implications of micro-level research. One point at issue concerns long-run dynamics. Is it possible that mortality decline puts in train a series of responses and counter-responses, some of which involve capital accumulation and growth, that eventually culminates in lower fertility, lower mortality, and a lower net reproduction rate? Hints of such a feedback dynamic appear in the recent aggregate-level studies of Schultz (1994a, b) and Galloway et al. (1998). The results of Galloway et al. (1998) for Prussia suggest that the causal system linking mortality and fertility might be dynamically unstable, that is, configured in such a way that initial mortality declines could set off more-than-compensating fertility responses.

The possibility raised by such aggregate studies would seem inconsistent with the best individual-level evidence on the fertility response to child death. The Preston (1978) volume, in addition to defining the insurance effect, identified two further individual-level mechanisms by which child mortality might affect fertility. The mechanisms are the lactation-interruption effect, by which a death removes the contraceptive protection of breastfeeding; and the behavioral replacement effect, consisting of deliberate parental strategies to conceive so as to “replace” the dead child. Preston and his colleagues supplied initial estimates

of the strength of these mechanisms, finding that the responsiveness of individual fertility to the loss of a child was much less than one-for-one. Two decades later, contributors to the Montgomery and Cohen (1998) volume, armed with richer data and more sophisticated methods, reached much the same conclusion.

In short, the lactation-interruption effect and the behavioral replacement effect can be powerful influences on individual fertility; but whether taken singly or together, they are not so powerful as to induce a more-than-compensating fertility response. If history is indeed a story of greater-than-compensating responses—an intriguing, plausible, but certainly arguable point of view—then the search for the key mechanisms should shift to the insurance effect and to other aspects of family behavior, linked indirectly to mortality, that could strengthen the feedbacks from demographic to economic change.

The plan of this paper is as follows. I first present a brief overview of changes in mortality and fertility in selected developing countries, the main aim being to document the variety of transition paths and to illustrate the length of lags. I then turn to a lengthy analysis of the insurance effect. As did Preston, I begin by locating the effect in individual perceptions; but in tracing this line of reasoning, I will show that it leads to issues that seem far afield of the original conception. The third section considers the links between mortality decline, investments in children's schooling, and other forms of capital investment. Conclusions are given in the final section.

PATHWAYS OF MORTALITY AND FERTILITY

Over the period 1950 to 1995, developing countries followed a variety of transition paths. The diversity of experience is evident in Figures 1–4, which present total fertility rate, infant mortality (${}_1q_0$) and child mortality (${}_5q_0$) series for selected developing countries in each of the major world regions. The infant and child mortality figures are scaled according to the left vertical axis; the total fer-

tility rates are scaled as shown on the right axis. The figures present five-year averages beginning in 1950 where such data exist. Note that the range of the vertical axes differs depending on country.¹

As can be seen, many of these countries have obeyed the textbook transition scheme, with mortality declining first and fertility following after a lag. In South Asia, Bangladesh provides an example of the pattern; in Latin America, so do Brazil, Colombia, and Mexico; in Southeast Asia, Indonesia and Malaysia also follow the expected sequence; and in Africa, Botswana, Kenya, and Senegal do likewise.² Even in these textbook cases, however, the lags in response are variable and worthy of consideration. In other countries (e.g., India), fertility and mortality decline were both in progress during 1950–95, and no lag can be detected in the figures. Among the countries considered here, none underwent fertility decline without some prior mortality decline, but as Haines (1998) shows for the United States post-1800, such cases can be found in the historical record.

For present purposes, perhaps the most interesting examples are those in which significant mortality decline took place without evoking any apparent fertility response. As Rosero-Bixby (1998) shows, in Costa Rica a decline in child mortality was evident as early as 1910; but it was not until 1960, by which point child mortality had fallen below 100 per 1,000, that fertility also began to decline. In the figures presented here, both Pakistan and Cameroon give evidence of substantial long-term decline in mortality but minimal reduction in fertility. How are lags of this length to be explained?

To be sure, since fertility and mortality depend on many factors, simple bivariate graphs can provide little clear guidance about causal effects. Not even the dates of decline can be established without controversy. Much depends on the measure of mortality used (infant mortality as against child mortality), the measure of fertility employed (marital or total fertility), and the method used to de-

Figure 1 Total fertility rate and child mortality rates in Bangladesh, India, Pakistan, and Sri Lanka: Five-year averages for 1950–95

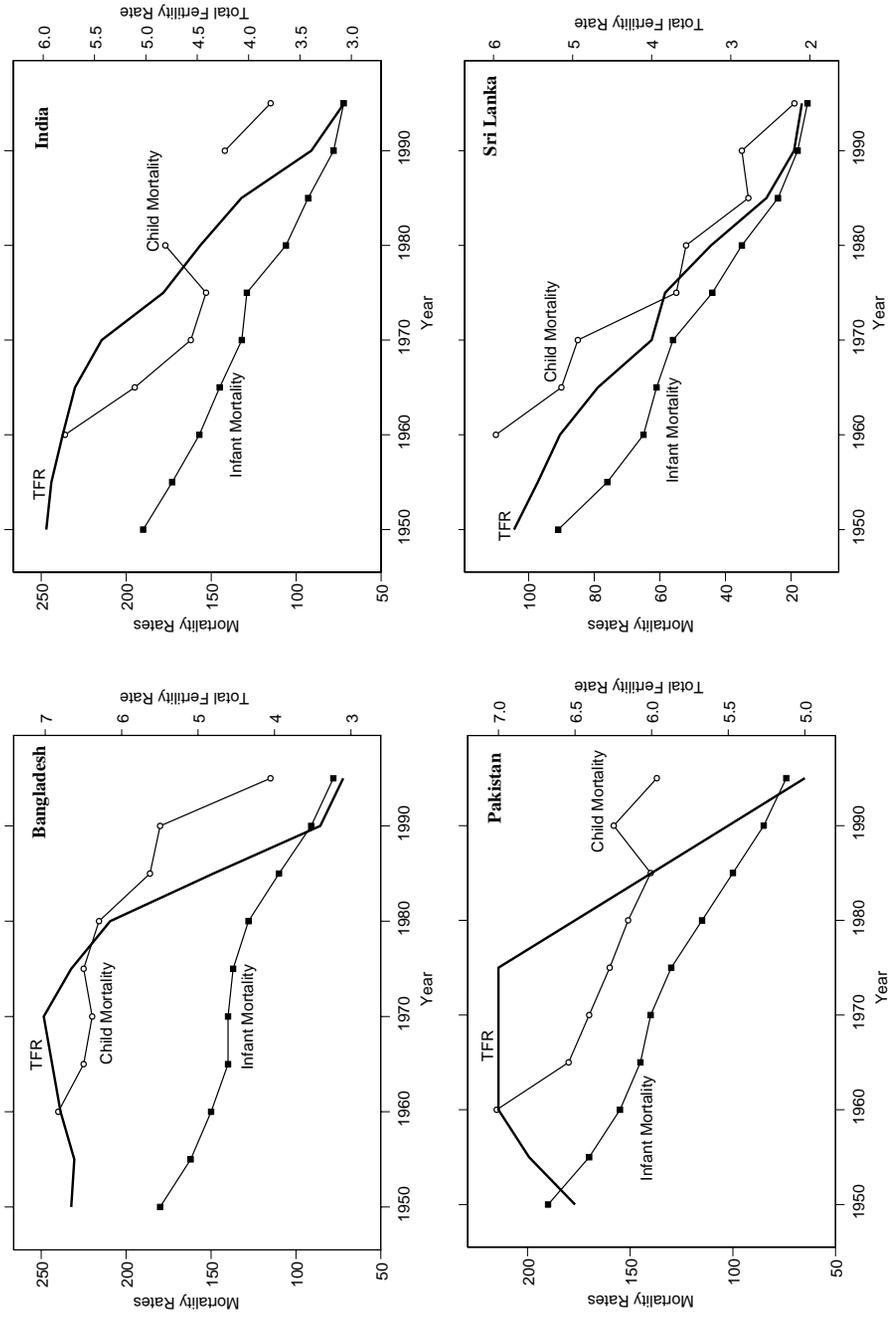


Figure 2 Total fertility rate and infant and child mortality rates in Brazil, Colombia, Costa Rica, and Mexico: Five-year averages for 1950–95

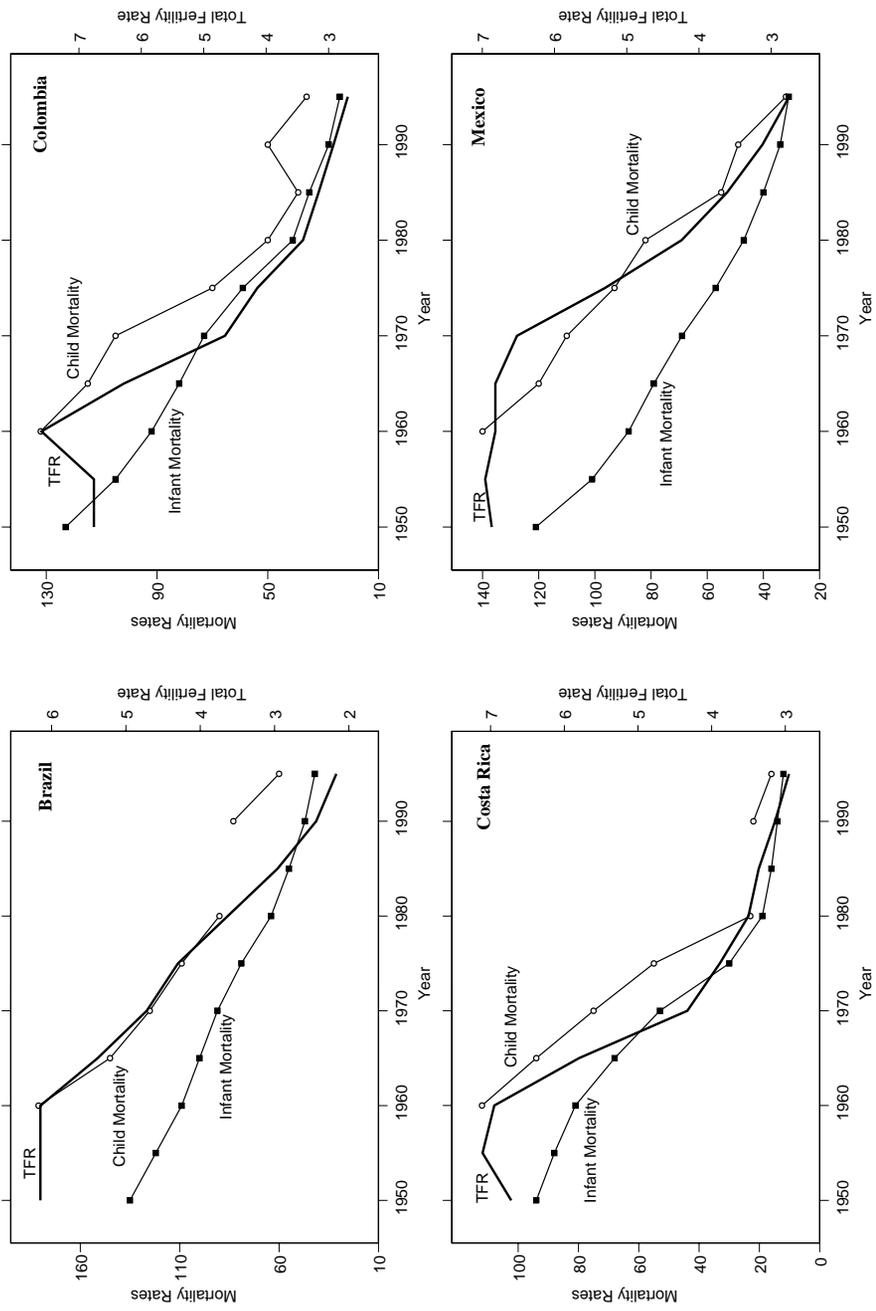


Figure 3 Total fertility rate and infant and child mortality rates in Indonesia, Malaysia, Philippines, and Thailand: Five-year averages for 1950–95

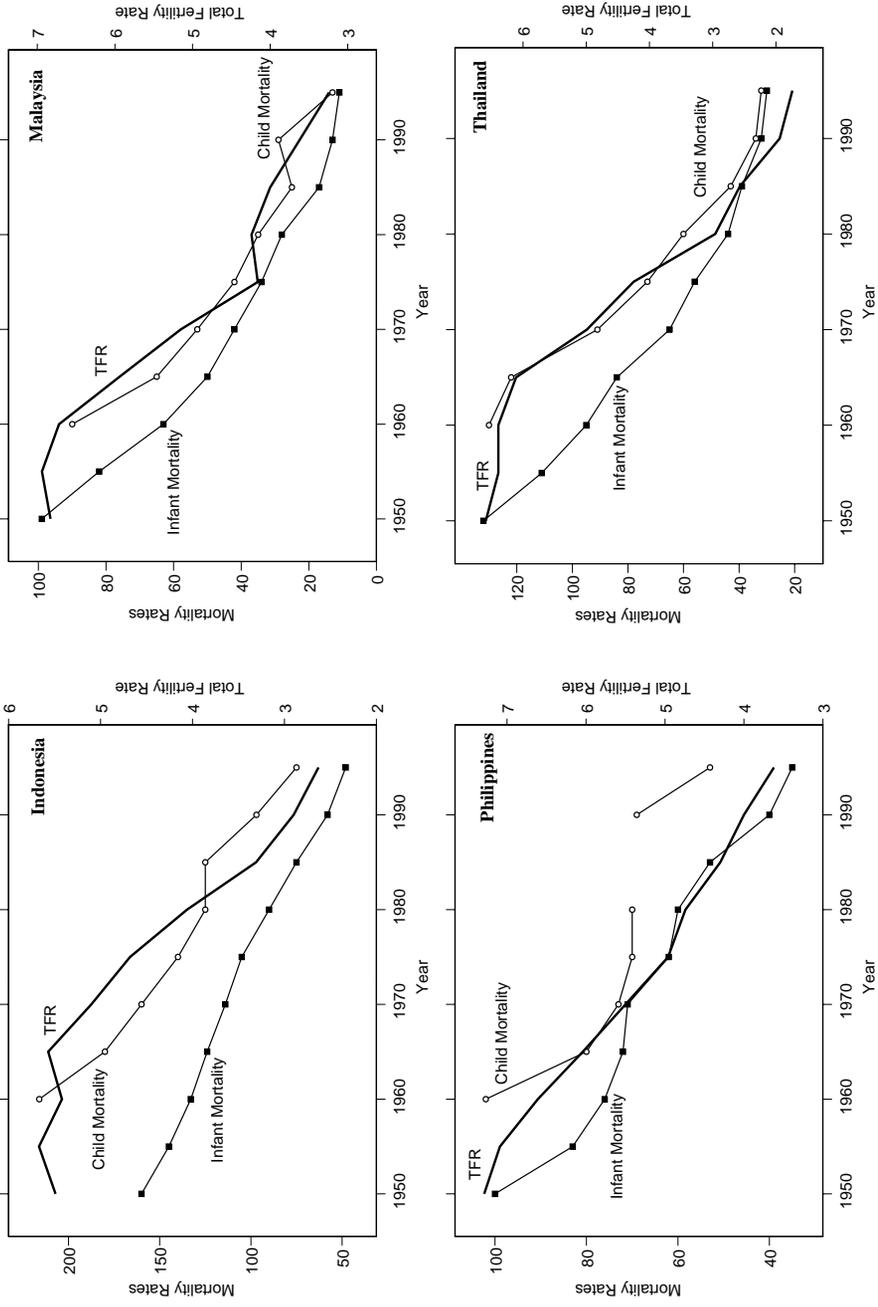
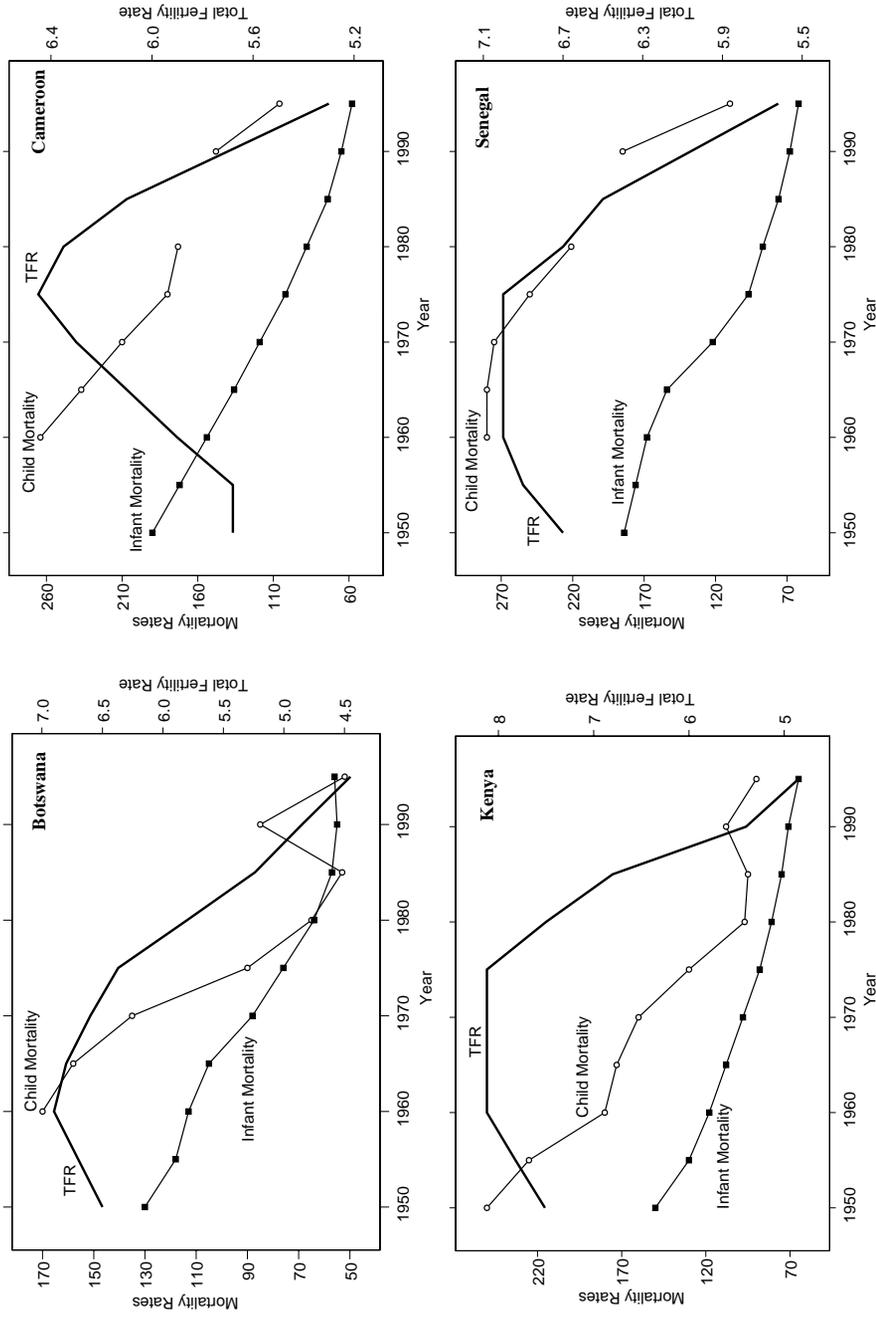


Figure 4 Total fertility rate and infant and child mortality rates in Botswana, Cameroon, Kenya, and Senegal: Five-year averages for 1950–95



fine onset of decline. My point is only that great variability exists in the transition paths of mortality and fertility, and that fertility decline often occurs decades later than the decline in child mortality.

One might fully expect the response of fertility to be slow. In settings in which both mortality and fertility have been high, to adopt a new strategy of family limitation is to embark on a risky course of innovation, one that lacks clear social guidance and normative support. Few people would expose themselves to criticism if they adhered to the status quo. Potential innovators might well be deterred by the prospect of child loss, even if they view the likelihood of mortality as low in comparison to what it was in the past. They might feel unable to proceed without additional confirmation of their views, and may therefore delay until very sure of the lower risks.

Such conservatism in risk-taking is predicted by new theories in psychology and economics. Experimental research on prospect theory (Kahneman and Tversky 1979) and the economic models of behavior derived from it seem to have uncovered a fundamental asymmetry in human behavior (see Camerer and Kunreuther 1989; Camerer 1995; Conlisk 1996; Mellers et al. 1998). It appears that, in situations of uncertainty, sensitivity to potential loss often tends to be greater than the attraction of equivalent potential gain. Furthermore, in the view of some psychologists (see Mellers et al. 1998), regret seems to be felt more keenly following decisions to act rather than following decisions to accept the status quo. This recent literature suggests that the anticipation of regret is an under-appreciated consideration in decisionmaking in cases of uncertainty.

If such findings can be extrapolated to the case at hand, they would suggest that new strategies of fertility limitation, insofar as they are motivated by lower mortality, should not be expected to appear on the heels of mortality decline. Potential innovators risk feeling regret should their new strategy fail, and they

may also encounter social sanctions and criticism from family elders and others who have never seen the need to deviate from the status quo. To buttress their own positions and fend off such attacks, innovators may need incontrovertible evidence of lower mortality risks before they proceed. From what sources can such evidence be drawn?

PERCEPTIONS AND AGENCY

Despite the importance that must always be attached to fertility, women in high-mortality, pretransitional societies often express no clear preference about the number of children they will bear (see, for example, Knodel et al. 1987; van de Walle 1992). Fertility decisionmaking in such settings is sometimes described as being passive or even “fatalistic.” More accurately, perhaps, it can be seen as the result of a rational stance vis-à-vis a highly uncertain environment, in which the pervasiveness of uncertainty means that decisionmaking must be reactive and highly contingent. As child survival becomes increasingly assured, however, a different form of decisionmaking is permitted to emerge, one that involves forward-looking strategies that play out over longer time horizons. Parents may then begin to entertain the possibility of influencing the size of their own families, instead of leaving such matters to chance or to higher powers. As the number of children begins to assume importance as a decision option, so, too, do new forms of investment in children that would have been dismissed previously as too risky. Lloyd and Ivanov (1988) have described the transition as a shift from family-building by fate to family-building by design.

The extension of the time horizon and the enhanced sense of agency are expressions of profound changes at both the individual and societal levels. Where fertility decisions are concerned, individual perceptions of the level and trend in mortality must be central, as must an increased confidence in the cause-and-effect payoffs of modern health care. The perceived levels and trends will exert

some influence over fertility decisions even if mortality decline is largely exogenous to families, being, for example, the result of investments in sanitation and public works. Once the improvement in survival becomes evident, the idea that mortality might be controllable can draw attention to modern health care strategies that promise to reduce risk further. Widespread adoption of such strategies will depend on whether the modern system is positioned to help.

Little is known about the personal and social determinants of perceptions, or about the conditions that encourage the investment of trust in modern health institutions. In what follows, I will argue that individual perceptions of mortality risk are not likely to track the improving empirical realities without an intervening period of upward bias and uncertainty. Biases in the perception of exogenous mortality change will themselves tend to retard fertility transition. If survival is further seen to depend on access to effective health care, then considerable time may be required for the modern system to demonstrate its effectiveness and win the confidence of its potential clients. This, too, can delay the fertility response.

Mortality perceptions

Remarkably little demographic research has considered the possibility of a gap or lag between the changing empirical risks of mortality, on the one hand, and the perception of these risks, on the other. Some gaps and lags in understanding are to be expected, of course, but the social circumstances associated with long lags and enduring biases in perception have not been studied. Although the demographic literature has been largely silent on the matter, some insights can be gleaned from an extensive literature in cognitive and social psychology on the issue of lay perceptions and understandings of risk and probability (Montgomery 1998).

The psychological literature suggests that, if left to their own perceptual devices, individuals may be poorly equipped to comprehend the improvements

in survival that are underway. The facts that are readily accessible to them will seem to support alternative interpretations, and considerable time can elapse before the downward trend in risk becomes fully apparent. One should therefore expect the initiation of mortality decline to be followed by an interim period during which the phenomenon is in doubt. Mortality decline will be dimly perceived by some but stoutly denied by others, and most will be left uncertain.

In many ways, the case of mortality decline exemplifies the perceptual difficulties that confront laypeople in matters of probability and risk.³ Some form of probabilistic thinking may well be required even to perceive that mortality decline is in process. A lay counterpart to the concepts of events (deaths) and population at risk seems to be needed, as would a means of separating the numerators from the denominators. It is not at all obvious how the layperson, situated in a rural village or living amid the bustle of a developing-country city, would find herself equipped with such concepts and information. Since mortality decline gives rise to more rapid natural increase, total deaths may increase even as the crude death rate decreases. This no doubt compounds the problem.

A further difficulty is the natural tendency among laypeople to view death as the noteworthy event, with its logical complement, survival, attracting less attention. Psychologists would term survival a “null event” from the viewpoint of the layperson (Estes 1976; Nisbett and Ross 1980). As long as a child survives, nothing really seems to have happened, whereas a child death is readily marked as an “event.” Perceptual biases are accentuated by the tendency, well documented in the psychological literature, for negative events to exert a disproportionate influence on beliefs, while positive events appear to have much less subjective impact (e.g., Skowronski and Carlston 1989; Taylor 1991; Viscusi 1997). Lloyd and Ivanov (1988) note that as survivorship improves, the changing age pattern of risk helps to distinguish the relatively high-risk period of infancy from the post-infancy period in which survival is almost assured. As mortality decline

proceeds, a dividing line emerges that helps to draw attention to the fact of survival, making it easier to regard survival itself as a noteworthy event.

The literature also shows that, often, a layperson will attach too much weight to a small sample of immediate experiences—say, a few years’ worth of births in his own village—a tendency that can overwhelm the efforts of public health campaigns to convey a broader and more representative picture. Adding to these difficulties is what psychologists term the “primacy effect,” by which events that occur early in a temporal sequence appear to exert disproportionate influence over later beliefs. In the case of mortality experience, one might form one’s first impressions of risk during childhood or adolescence, these being relatively high-mortality periods in an era of secularly declining mortality. This early experience may establish a durable perceptual frame that resists revision. One’s own direct experience with risks, derived from a lower-mortality period, might prove insufficient to dislodge earlier beliefs.

Another aspect of the problem is the need to separate average mortality risk from its variance (Slovic 1972). High-mortality environments usually exhibit considerable variability in mortality, with experience being punctuated by occasional episodes of famine, flood, and epidemic. Looking back on such experience, the layperson might find it difficult to discern the general downward trend in risk, with memory distracted by such vivid and catastrophic occurrences.

The common theme in these observations—necessarily offered tentatively, given the absence of demographic research—is that individual perception alone is probably a poor device for detecting downward trends in mortality. Individuals cannot be expected to act as lay statisticians: they lack both the necessary information and the conceptual framework for organizing it. If left to themselves, they would seem to be ill equipped to filter the signal from the surrounding noise.

In time, of course, perceptions will come to be corrected and mortality decline will come to be understood. But if unaided individual perception is as

weak a discriminator as I have suggested, might the key to learning be the information that individuals draw from their social interactions? Information can be gathered from interactions with family, discussions in peer groups and other social networks, and conversations with the better-educated; it can be distilled from media messages and from the modern health sector. All these can be regarded as avenues for social learning and diffusion (Montgomery and Casterline 1996), by which new ideas about mortality risks come to intermingle with the old.

Learning from family. Children growing up in high-mortality environments will inevitably know or hear of the deaths in infancy and childhood of their siblings and other relatives. Mothers, fathers, and elders may sometimes tell children of their own family histories, which unfolded in even higher-mortality eras. As children enter adulthood and begin to build their own families, much of the social knowledge they inherit would thus seem to exaggerate the current level of mortality risk.

Working against this, however, is the possibility that with declining mortality, the parents of one generation will find themselves surprised by the number of their children who have survived, that is, surprised in relation to the number they had somehow expected to survive. Parents may find their larger-than-anticipated families pressing against scarce resources such as land. Looking about them, they may observe their peers also struggling to accommodate larger surviving families. When it can be set against some readily understandable denominator—such as arable land—the fact of improved child survival may then clearly impress itself upon the older generation and become part of the social knowledge they bequeath to their own adult children.

Social learning of this form would seem to require considerable time, during which the data are pieced together by the older generation, slowly understood, and the implications then imparted to the young. If this is indeed the decisive form of social learning, it would imply very long lags—perhaps as much as

a generation—between the initial stages of mortality decline and the beginnings of the fertility response. The mechanism requires something akin to a comprehensible denominator, and the role suggested above for land might not apply to rural areas with substantial out-migration or have any obvious counterpart in urban areas.

Learning through social networks. Networks of peers and other contemporaries may allow social learning to proceed at a faster pace. Just as with familial experience, however, it is difficult to say whether information drawn from social networks must necessarily reduce the upward biases of individual perceptions. Much depends on the nature of these networks and the variety of information possessed by network members. The notion of “weak ties” is pertinent here (Granovetter 1973).

Consider an individual woman whose social network is homogeneous, being largely populated with her peers. The network is then rather like a small population in which, over a short period, the stochastic nature of births and deaths can give a misleading picture of the underlying probabilities. If attention is selective, tending to focus on negative events, then instances of child death within the network will come readily to mind, will have the force of immediate example, and will seem to disprove the hypothesis of mortality decline. Moreover, in a high-mortality population, at least one woman in each network can be expected to know of a statistically unusual case, such as a family that has lost all of its children. Her experience can be shared with her network partners, and if such atypical cases dominate perception, the propagation of information by networks might further exaggerate individual bias.⁴ As long as the perceptual biases described above are widely shared, and as long as individual network members do not possess novel information that forces long-held beliefs to be reexamined, the fact that individuals are linked to each other by networks need not bring perceptions any closer to the empirical realities.

If social networks are heterogeneous, however, either in perceptual style or in information, then social interaction can serve as a corrective. Consider a case in which an uneducated woman is linked to a network partner who has some experience of primary school. Through schooling, this somewhat better-educated woman might have absorbed a few facts about health conditions and changes in survival. She could have learned to be more attentive to the messages about health and health care that emanate from government and the media.⁵ She might at least have been exposed to the idea that mortality is controllable, a view that in itself would tend to heighten attention to information (Simons 1989). When shared with her network partners, the educated woman's example or experience might lead them toward a new way of thinking about their own environments. Functioning in this way, heterogeneous networks, in which some members are connected to others who possess distinctive information, can assist in spreading new views of mortality risks and the emerging health care options.

New conceptions of adult mortality risks may also be shaped by information exchange. Adult beliefs about risk may be much affected by the perceived incidence of premature death, whether due to maternal mortality, accident, or AIDS. In some developing-country settings (notably, in West Africa), adult social networks can exhibit an extraordinary breadth.⁶ Such wide networks facilitate transmission of information about premature adult death, and this alone might cause the risks to be exaggerated. Yet, wide networks may also offer weak links to better-educated or urban residents who have new ideas to share about improving health and declining mortality risks. Here, too, the net effects of social interaction are ambiguous and dependent on network structure and heterogeneity.

I have stressed the role of social learning in the transmission of information about risk, but some potentially important byproducts of social interaction need not depend on learning as such. Ewbank and Preston (1990) and Lindenbaum (1990), among others, have stressed the power of social example in spreading

new models of personal hygiene. In Lindenbaum's depiction of rural Bangladesh, better-educated women often adopt distinctive practices in their childrearing and discipline, in their treatment of food, and in the cleanliness and order they impose on home and courtyard. They do so not because they expect benefits to materialize in the form of better child survival—there may be no perceived connection whatsoever—but rather to establish a certain social distance between themselves and other villagers. Nevertheless, if the better-educated women succeed in presenting themselves as models worthy of emulation, their example may encourage new and beneficial forms of behavior.

Personal agency and modern health care

Exogenous mortality decline can be seen as the result of economic development and the improvements it brings in individual incomes and government investments in public health. Particularly in the early stages of development, however, such improvements are apt to be unevenly distributed, with benefits conferred on some socioeconomic groups and regions while others are left largely in isolation. Furthermore, although exogenous factors will remain important, deep declines in mortality almost surely require access to modern methods of disease prevention and cure. Access to these methods entails money, time, and social costs, so that if their use is to be widespread the benefits of modern methods must be commonly perceived to outweigh the costs. The perception-based motivations for modern health care use are therefore central to the endogenous aspects of mortality decline.

A key factor in the transition to lower mortality is the expanded scope for personal agency and the redirection of agency toward the modern health care system. The concept of agency is central in much of the literature on health decisionmaking, where it appears under various guises—internal locus of control (Higginbotham and Connor 1990; Landau 1995), coherence and predictability

(Lundberg 1997, citing Antonovsky), and self-efficacy (Bandura 1988). It is an important feature of economic expected-utility models of health decisions and figures as well in the closely allied health belief model (Becker et al. 1977) and the theory of reasoned action (see Vanlandingham et al. 1995).

As much of this literature shows, a sense of agency is active in high-mortality, pretransitional societies, where individuals engage in any number of preventive and curative health behaviors. But the scope for strictly personal agency is much more limited in these societies, and modern health care (where available) tends to be seen as having restricted powers. The link between individual choice behavior and modern health care may therefore be weak or elusive, often emerging only in certain stages of illness.

Some illnesses first manifest themselves in a benign, everyday form that, even in pretransitional settings, allows considerable latitude for individual decision and experimentation. In the early stage of illness, modern health treatments can be employed along with various home or traditional remedies; the caretaker or afflicted individual is permitted some freedom in choosing among the options. If the illness progresses, however, understandings of its root cause may also shift, and it may come to be recognized as the expression of malevolent earthly or powerful supernatural forces. Once the new interpretation is adopted, modern health treatments may be discarded as largely irrelevant. The locus of control may then pass from the individual to the wider social group, sometimes involving family elders and traditional healers, who attempt to understand the meaning of the illness and act accordingly.

Kirby (1997) describes the case of the Anufo of northern Ghana, whose vocabulary of illness distinguishes a “cool” or “white” stage of illness from a hotter or “red” stage and, as death approaches, a final “black” stage. These categories represent ways of ordering the interpretations of illness and allow the Anufo to express their shared understandings of the causes and remedies that apply to a given stage. In the white stage of simple, everyday illness, individuals

may experiment freely with Western and traditional medicines. But, as the illness worsens and enters the more serious red stage,

Now everyone has a specific role to play and the entire process is orchestrated by the elders. Ill persons are no longer free to exercise their individual decisions in the matter, mothers are no longer free to take their children to the clinic or to prepare amateur herbal treatments. All activities of self-help, characteristic of the pre-diagnostic [white] stage, cease. (Kirby 1997: 223)

Although the transition from individual to collective action is not always so marked as in West Africa, a great number of societies show similar tendencies in classifying illnesses and tailoring responses.⁷ In many settings, illnesses such as neonatal tetanus and measles present symptoms that are immediately recognized as the expression of powerful external forces working against the child, its parents, or the community. Illnesses such as these will not naturally fall within the scope of the modern health care system. In West Africa, a belief in “spirit children” (Feyisetan et al. 1997) remains common: children who, because of their circumstances of birth or distinctive early behavior, are understood to be only tenuously linked to life and may easily slip back into the other world. In other societies, such as in northeastern Brazil (Scheper-Hughes 1992), some children are thought to be born without sufficient interest and will to survive. Through no one’s fault, it is believed, they are unlikely to live and little can be done about it. All these are situations in which social definitions decisively limit the reach of modern health care.

Extending the modern system’s reach. For the modern health care system to take a more prominent place in decisionmaking, it must first display its superior effectiveness in regard to either prevention of illness or cure, and the system must be organized to permit access to care of adequate quality. How, then, does

the modern system prove its effectiveness? To the layperson, what constitutes evidence? When is such evidence felt to be persuasive?

Views of effectiveness are dependent on both individual and social experience, with each of these being filtered by perception. In health, the modern system proposes new causal explanations for illness and advances claims for new causal links between modern care and positive child outcomes. At least where treatment is concerned, one might think that a few rounds of exposure to the modern techniques would prove sufficient to sway any skeptics, leaving it incontrovertibly clear that the new methods will improve survival.

Yet, as discussed by McKenzie (1994) and Nisbett and Ross (1980), there are severe constraints on laypeople's abilities to detect such covariation in their immediate experience. The key concepts in covariation detection are those of "distinctiveness," or the extent to which the outcome of interest is mainly observed in the presence of one cause, and "consistency," which describes whether the outcome is always observed when the proposed cause is present. If such criteria are applied to health care, in which the link between treatment and response is necessarily probabilistic, the advantages offered by the modern system may seem less than obvious. After all, sick children sometimes recover after being treated by a traditional healer, and not all children will thrive after receiving modern treatment. Potential users must learn, over time, to appreciate the higher recovery probabilities associated with use of modern care, a task that may call for finer powers of discrimination than they possess.⁸ Understandings of modern preventive health care, in which behavior and outcome are separated in time, may prove even more difficult to achieve.

Perceptual difficulties are especially likely if long-established health beliefs screen the proposed new relationship from view. In some settings, the relative ineffectiveness of traditional health care may be well disguised, for as Nisbett and Ross write,

...objectively low or nonexistent covariations can be parlayed into massive perceived covariations through a priori theories and assumptions.

Unexpected, true covariations can sometimes be detected, but they will be underestimated and are likely to be noticed only when the covariation is very strong, and the relevant data set excludes 'decoy' features that bring into play popular but incorrect theories. (Nisbett and Ross 1980: 97, 109)

Thus, in a society with coherent and internally consistent traditional beliefs about the origins of illness, appropriate means of prevention, and routes to cure, modern health care may initially struggle to make a persuasive case (Caldwell et al. 1983).

The difficulties facing advocates of the modern system should not be exaggerated, however. Most societies have seen a good deal of inter-penetration of modern and traditional health systems (e.g., Pitts et al. 1996; Haddad et al. 1998). Lay understanding of health is often not well organized, and in many settings individuals seem to adopt eclectic and improvisatory approaches. Bierlich describes health decisions in northern Ghana as follows:

People make use of both local and Western medicines, without knowing or being committed to the technical or philosophical premises of one or the other medical system. People are generally uncertain about the cause and outcome of illness and often act in advance of evidence about its cause. Their practices are not homogeneous, but diverse or 'un-systematized,' and highly innovative. Their approach to treatment shows itself in their general readiness to experiment with all kinds of medicine, simultaneously or serially. Medicines, local

and Western, are used in a trial-and-error manner. If one does not produce the desired result, another medicine is tried instead. 'We are just trying,' people say. (Bierlich 1995: 505)

Such fluidity is also noted by Ryan (1998) and Cantrelle and Locoh (1990), who mention the practice of double consultations for illnesses that might be seen to have either a natural or a spiritual cause.

In settings such as these, the modern health care system can seize upon opportunities to associate its methods with the traditional vocabulary and understanding of health. Kirby (1997) notes that Western medicines can be associated with the "white" or "cool" initial stages of illness to encourage timely use. Vaccines can be described as strengthening the protection already being provided by amulets (Findley 1990; Nichter 1995); injections can be likened to beneficial fluids where good health is thought to result from the balance of positive and negative fluids (Bastien 1995); and oral medications can be left unsweetened and bitter to underscore the point that they are powerful.

Of course, the mapping of modern methods onto traditional labels will often prove to be imprecise (Gove and Pelto 1994). The consequences of such mis-mapping have been explored by Nichter (1990, 1995) in regard to community views of vaccination campaigns in South Asia. Nichter's research illustrates the consequences stemming from folk labels that are too broad in relation to the specific protective powers of a given vaccine. Suppose that the local label covers a cluster of illnesses with similar symptoms, with the vaccine being effective against only one illness in the cluster. This can lead to instances of apparent vaccine failure, which would undermine confidence in the vaccine's efficacy and cast doubt on the claims of health personnel.⁹ The modern system may succeed in conveying the simple and general message that vaccines are good for health, but then fail to clearly differentiate these vaccines. In consequence, the local popula-

tion may come to believe that vaccines are all very much alike. Parents may lack motivation to comply with the full regimen for any one vaccine, and may not grasp why they should keep track of the number of vaccinations of a particular type a child has received. This, too, can lead to cases of apparent vaccine failure.

The matching of modern methods to folk concepts is therefore not a simple task. Success would seem to require sensitivity to audience and language, local research, and bureaucratic follow-through. But the professional image that modern health providers seek to present to their clients—and the militaristic mind-set adopted by some vaccination campaigns—too often preclude respectful exchange of information. The ill and their caretakers are seldom told, except in the broadest terms, why they should follow the modern regimen, and their compliance is sometimes secured only by the exercise of social force. Without real learning, the net effect is a grudging obedience to the dictates of health personnel and only a superficial identification with the modern health system.

Fortunately, the widespread use of modern health care does not require the local population to see the root causes of illness in the same way as their Western-influenced providers. Disparities in the understanding of causes are not necessarily inconsistent with use of the modern system (Feyisetan et al. 1997; Cleland 1990; Raharjo and Corner 1990). Indeed, as Cleland (1990) argues, health-related behavior is likely to change faster than underlying cultural beliefs about root causes. What matters is that the modern system is perceived to be effective and that it has the resources necessary to deliver on its promises.

Social and political agency

As the modern health sector's potential advantages gradually become clarified, so, too, will many of that sector's limitations. Continuing shortages of medicine, high fees and long waits, the intermittent presence of key personnel, the

abusive or condescending treatment of patients—all these will be exposed as the population comes into increasing contact with clinics and hospitals. Having been persuaded of the theoretical superiority of Western medicines, people may nevertheless avoid the modern system because of its higher social and monetary costs.

In successful transitions, this tension is eventually resolved with the emergence of new forms of social and political agency with respect to health. The concept of equity begins to be applied to the distribution of state-controlled health resources, and, with it, the definition of a right to press demands on the state for resource provision. Local, regional, and national political networks may evolve and provide a forum for voicing such demands. Such new political dialogue can eventually succeed in redirecting governmental priorities and improving the quality of health systems. When groups succeed in drawing the attention of the state to their needs, this may further enhance the sense of individual agency on the part of their members. A number of accounts, both historical and contemporary, have emphasized the importance of such social and political dynamics (Dye and Smith 1986; Caldwell 1986; Lindenbaum 1990; Ewbank and Preston 1990; van de Walle and van de Walle 1990).

The record of the United States in the late eighteenth to early twentieth centuries provides one case in point. Dye and Smith (1986), drawing their evidence from women's diaries, find in this period that the possibility of child death was an ever-present concern. Vinovskis (1991), using similar materials, argues that mortality perceptions were likely to have been inflated in relation to the empirical realities. He locates one source of this exaggeration in the influence of religious institutions and the social emphasis attached to funerals.

Yet, with mortality still high, and even before the advent of modern medicine in the last years of the nineteenth century, a shift in the scope of personal agency began. The key change was that, over the century, childrearing responsibilities were increasingly assigned to mothers, rather than being distributed among various kin and caretakers as in the earlier era (Dye and Smith 1986). As mothers

began to be entrusted with the task of safeguarding their children, and as good mothering began to be defined in these terms, the lack of any truly effective medical care led to tensions between the newly assigned social roles and the limited health care options. Until the very end of the century, these socially defined obligations could not be properly discharged; the result was mounting anxiety and a sense of frustrated personal agency.

When the medical breakthroughs were finally made, women responded in both personal and political terms (Dye and Smith 1986; Ewbank and Preston 1990; Preston and Haines 1991). In personal terms, they enthusiastically adopted the new medical techniques of the late nineteenth and early twentieth centuries, and were attentive to and adhered to advice. In the political sphere, activists channeled collective energies to the creation of the Children's Bureau, supported local conferences and instruction for young mothers and girls, and aided other government and public health institutions. Thanks to the prevailing levels of literacy, pamphlets and even newspapers helped to diffuse information.

The foregoing brief account of the U.S. experience illustrates more general themes that have been given little research attention by demographers. The U.S. account raises the issue of perception of mortality risks, as against the empirical risks themselves. It underscores the distinction between high risks and risks that, although still high at the end of the nineteenth century, were increasingly believed to be controllable. The key role was played by new health care options that emerged at the turn of the century, with support from new germ theories that gradually supplanted the older notions based on miasmas, sewer gases, and the like. Literacy helped to spread the new ideas among women; but also important was the diffusion of information between public health practitioners, on the one side, and a somewhat reluctant medical profession, on the other (Preston and Haines 1991).

The mix of personal, institutional, and political responses is not unique to the United States: Caldwell (1986) presents a similar account of the factors in-

volved in mortality decline in Kerala. In the U.S. case, as has been true elsewhere, all these factors figured into the development of family-building strategies that stressed design over fate, encouraged deeper investments in child quality, and were eventually expressed in lower fertility.

MORTALITY AND INVESTMENTS IN CHILDREN

Once mortality decline is acknowledged to be underway, does the newly recognized trend reshape household decisionmaking in areas other than fertility? In particular, how might mortality change affect children's schooling? If human capital investment is encouraged, this investment could spur economic growth, which in turn might lead to lower future levels of mortality and fertility.

The first link in this chain of reasoning requires a mechanism that could plausibly connect mortality decline to schooling. After all, the vast majority of child deaths occur to children who have not yet reached school age. How, then, can schooling investments be directly affected by mortality decline? As Preston (1980: 324–326) showed, the mortality risks facing children in adolescence and the early adult years are relatively low even in high-mortality environments. Thus, from the viewpoint of the child who is old enough to embark on a school career, improvements in survivorship could have little effect on the private rate of return to schooling.¹⁰ The direct impact of mortality decline would therefore seem to be small.

Several indirect links, however, warrant consideration. First, high-mortality settings are often characterized by high morbidity. Morbidity may be associated with delayed entry to school, interrupted attendance, and eroded abilities to learn (Behrman 1996; Alderman et al. 1997). All these will tend to reduce the payoffs to schooling and thereby reduce the motivation for parents to pursue it. Another possibility is that if insurance effects are operative, higher mortality risks will be associated with higher fertility, with the result that in a typical household more young siblings may be present who will need care. Child care and

related household responsibilities may divert time and attention from school, particularly for girls, and this may undermine abilities to learn and lower the returns to further schooling.

A third mechanism involves adult mortality. Environments with high infant and child mortality are also characterized by high adult mortality, and, as noted above, parents may hold exaggerated views of adult mortality risks. Since it is parents, rather than children themselves, who finance human capital investment, the parental time horizons and perceptions of risk are key factors in determining whether the investments are made. In many developing countries, fathers take on much of the burden of paying school fees and associated charges. Particularly where substantial age gaps separate husband and wife, the fathers of school-age children may often be of middle age themselves, entering a period in which their risks of mortality will be felt to be appreciable. They may well be reluctant to embark on ambitious programs of human capital investment in their children, given the possibility that the child's schooling might have to be truncated in the event of a parent's death. Even if a child's schooling can be completed, the time span during which the parents can expect to enjoy some returns will depend on adult mortality risks. Thus, when seen from the viewpoint of parents, perceived improvements in adult survivorship may considerably enhance the motivation for investing in children.

In addition to its effects on children's human capital, the expansion in parental time horizons may also encourage other forms of investment, such as through financial savings. Lee et al. (1998), focusing on Taiwan, show that the expected ratio of post-retirement years to working years can increase greatly with mortality decline. This can enhance motivations for private savings. The ability of parents to save may be limited if fertility remains high, however, since mortality decline will generate larger surviving family sizes.¹¹ If fertility falls, on the other hand, the effect on savings could be pronounced.

Through routes such as these, recognition of lower child mortality and improved adult survivorship may increase investment in both human and physical capital. In traditional settings, an important role for children is to serve as a form of savings; they embody parental claims upon future transfers from family. If mortality decline is accompanied by the emergence of better-developed financial systems and improved payoffs to human capital investment, educated children and monetized savings may be seen as more effective instruments than numbers of children alone. Since the requirements of children's education reduce the margin of income available for savings, schooling and savings will tend to compete for limited parental resources. Many factors will thus determine the balance of parental commitments between these two new dimensions of choice.

THE NEW AGENDA

A main theme in this wide-ranging discussion has been the need to appreciate the many perceptual difficulties and biases that hinder people's understandings of social change and retard their demographic responses. The essence of the insurance effect can be found in the complex of individuals' beliefs about the nature of the external environment they face, their sense of agency and ability to control that environment, and their understanding of the operation of cause-and-effect in health. Poorly equipped as they are to sort through the issues, individuals will probably be slow to recognize improvements in child and adult survival, whether these are linked to exogenous developments or to the new opportunities presented by modern health care. Without some assistance—from family, social networks, the better-educated, and health programs and policies—individuals will be reluctant to disengage their energies from traditional forms of demographic behavior and embark on a risky course of innovation. Although demographic research can offer no definitive proof, it is reasonable to think that the well-documented lags in the fertility response to mortality decline have much to do with the role of perceptions and beliefs.

A second theme is that mortality decline can set in motion a series of reinforcing responses, first in fertility and subsequently in mortality levels, with the long-term result being that higher survivorship becomes associated with a lower net reproduction rate. Little is known about the full causal chain or the important demographic and economic mechanisms that could generate such beneficial feedbacks. Demographers have given considerable attention to the impact of fertility decline on infant and child mortality. Although lower fertility is commonly believed to reduce the prevalence of high-risk births and to improve birth spacing, no consensus has formed about the magnitude of the impact on mortality (compare Trussell and Pebley 1984; Bongaarts 1987; Trussell 1988; Bongaarts 1988). The question need not be framed so narrowly, however. Both children's schooling and financial savings can be positively influenced by mortality decline, and capital formation will have broader consequences for economic development. It is at least possible that the most powerful feedbacks are those linking mortality decline to economic growth.

Much of the discussion above has taken mortality decline to be the dominant empirical phenomenon, but in some countries the prevalence of HIV infection will soon bring a halt to further declines and may sharply increase both adult and child death rates. The sheer scale of the impending losses in parts of Africa, and the inability of the modern health system to mount an effective response, when coupled with the personal shame and stigma that accompany the infection, will likely bring about profound confusion in beliefs. It is difficult to imagine that incentives for lower fertility can be maintained in such deteriorating environments. Individual time-horizons, once lengthened by the prospect of lower mortality, will be pushed back inevitably toward the present; motivations for saving, schooling, and other future-oriented behavior may be undermined.

The current state of demographic research permits very few of the effects that I have described to be quantified. Much work remains even to craft the appropriate measures. Where perceptions are concerned, standard survey methods

of inquiry are probably poor devices for detecting the nuances of the cultural and psychological context in most developing countries; even less-structured individual interviews would need to be carefully designed to accommodate local beliefs and vocabulary. In few settings will adults be able to articulate why they feel as they do about mortality risks; nor can they often trace for the interviewer's benefit the connections they see between mortality risks and fertility decisions. Thus, even a program of qualitative investigation would be required to break new methodological ground.

There are a few promising recent developments. A research project in Senegal, led by Kenneth Hill and Thomas LeGrand, has initiated a program of qualitative and quantitative research on these issues; a similar research agenda is being pursued in our own longitudinal study in Ghana. In the United States, innovative approaches to the measurement of mortality perceptions are being taken in the Health and Retirement Study (Hurd and McGarry 1995), the focus in this case being adult perceptions of their own old-age risks. Here, applied to a highly literate population that is well supplied with information from pension and insurance systems, survey methods have greater appeal and the initial results are provocative. If applied to a well-chosen developing-country setting, methods such as these may provide an excellent starting point.

Notes

- 1 These figures were assembled from several data sources. The total fertility rates and rates of infant mortality were drawn from United Nations (1996). For child mortality, several sources were consulted. Figures presented in United Nations (1992) were the main source, supplemented by figures and data from United Nations (1991) and United Nations Children's Fund (1992, 1997).

- 2 Cohen and Montgomery (1998) discuss these country experiences in more detail.
- 3 I present here only a sketch of the arguments; see Montgomery (1998) for the details.
- 4 Although it might be thought that an averaging process would eliminate individual errors of observation when opinions are exchanged in larger groups, studies of group dynamics do not consistently support this contention. See Montgomery and Casterline (1996) and the references cited therein.
- 5 LeVine and colleagues (LeVine et al. 1994; Stuebing 1997) have argued that schooling supplies individuals with the cognitive skills they need to translate the “decontextualized” language of the formal health care sector into terms that are meaningful to individual experience.
- 6 It can be argued (see National Research Council 1993: Chapter 4) that the long reach of networks in West Africa is itself the outgrowth of a need for social mechanisms of insurance and support, given the great uncertainties of the natural environment.
- 7 See Bastien (1995) for Bolivia, Bhuiya et al. (1990) for Bangladesh, Bierlich (1995) and Gyapong et al. (1996) for Ghana, Caldwell et al. (1983) for southern India, Cantrelle and Locoh (1990) for West Africa, Feyisetan et al. (1997) for Nigeria, Gove and Pelto (1994) on cultural understandings of acute respiratory illness and the related WHO program, McNee et al. (1995) for the Philippines, Pitts et al. (1996) for Zimbabwe, Raharjo and Corner (1990) for Indonesia, Ryan (1998) for Cameroon, Shawyer et al. (1996) for Thailand, and Sholkamy (1996) for Egypt.

- 8 Selectivity biases associated with the costs of access to modern care may further cloud the picture. When the modern system imposes high fees for its services or access is delayed by time and travel costs, children may not be brought to the clinic until their conditions are too far advanced for simple treatments—or any modern care—to be effective.
- 9 Nichter notes that traditional healers often draw fine distinctions among subcategories of illness, and are able to emphasize that their methods are effective against only some of these. The modern system might try to make the same distinctions and arguments to emphasize its comparative advantages.
- 10 Private rates of return are typically on the order of 12–15 percent; see Montgomery, Arends-Kuenning, and Mete (1998) for a recent review. According to Preston’s calculations, mortality decline would increase the rate of return by about one percentage point in a typical case.
- 11 The higher population growth induced by mortality decline will also affect aggregate savings through age-structure effects; see Lee et al. (1998) and Deaton and Paxson (1998) on the implications for Taiwan. Lee et al. caution that longer expected lifetimes need not bring about higher savings if old-age support remains largely a matter of family transfers, or if government takes on the support role that was earlier played by families.

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