

numerous hypothesis about the relationship between the caring role and personal well-being. The papers reviewed in this issue also suggest that the relationship between the caring role and carer well being is exceptionally complicated and further rigorous qualitative and quantitative studies will be required to unravel the differences which exist between different cultures and different welfare systems. As well as undertaking further, perhaps, more sophisticated non-descriptive analysis it would be helpful to undertake a meta-analysis of some of these studies in order to sift the effects of poorly constructed studies, small sample sizes, national and cultural differences and the changing nature of the caring task. Future research must be coordinated and focus on new hypotheses rather than simply replicate the best of what has already been achieved.

#### NOTE

- 1 Zarit, S. H., Do we need another 'stress and caregiving' study? *The Gerontologist*, 29 (1989), 147–8.

Health Care Research Unit,  
University of Newcastle upon Tyne

#### Morbidity and Mortality Trends

Tony Warnes

J. F. Fries, The compression of morbidity: near or far. *Milbank Quarterly*, 67, 2 (1989), 208–32.

It is ten years since the initial presentation of the compression of morbidity thesis (Fries, 1980). In this article, the author restates and refines his arguments and reviews the evidence from a number of large scale population and clinical trials. The original predictions were that life-expectancy gains at advanced ages would slow (in the United States population), that the male:female life-expectancy gap would narrow, and that reductions in age-specific incidence rates for chronic illness would exceed reductions in age-specific mortality rates. This last underpinned the derivative prediction that the variability in ages of death would decrease. Higher fractions of the population would survive until near the modal age of death, following which the survival curve would descend more steeply than at present: the survival curve would become more 'rectangular'. The projected reduction of the duration of chronic illness also implied a *per capita* reduction in health-care costs. It

was this implication which brought the thesis into the domain of public policy, by providing grounds to predict offsets to the growth in health expenditure expected from an increasing number of elderly people.

Behind these predictions is the belief that the maximum possible average life expectancy were approached by the 1970s. Future mortality improvements must therefore decelerate. Underlying the expected improvements in morbidity was a second premise, that the United States population was engaged in a 'national health habit experiment' to reduce exposure to the consensually recognised risk factors, tobacco smoking, the consumption of saturated fats and injury in road accidents (by wearing seat belts).

Whether Fries's thesis is correct depends fundamentally upon the determinants and duration of human longevity in the (virtual) absence of environmental insults including disease. Such a state many regard as abstract. Assessments of his thesis require knowledge not only about average life expectancy but also, and particularly, about the distribution of longevity in the human population. This knowledge is not available. An empirical understanding is also required about recent trends in morbidity in later life. Data on health is however lamentably scarce, partial in coverage, and weakened by definitional discrepancies. Analyses of long-term trends in age-specific morbidity remain exploratory. In the absence of a firm informational base with which to assess Fries's projections, and in view of the public and national expenditure implications of alternative morbidity projections, it is neither surprising that the 'rectangularity thesis' was vigorously debated nor that it is unresolved.

This article features the evidence from four randomised controlled trials of primary prevention interventions specific to cardiovascular disorders. There are the Multiple Risk Factor Intervention Trial, the Lipid Research Clinics Study, the Physicians' Aspirin Study and the Helsinki Heart Study. In all approximately 42,000 subjects were involved. Fries argues (p. 214) that two critically important conclusions from these studies have gone largely unnoticed; that effects on total mortality have been small, and that effects upon morbid events have been very large. Responding to the null mortality finding, Fries speculates as to whether there are offsetting effects from the toxicity of the drugs. He also criticises the practice when modelling future age-specific mortality of removing or reducing the likelihood of death from a specific cause and then attaching to the survivors average likelihoods of death from other causes. He argues controversially that this incorrectly ignores the competing risk of death from senescence.

The conclusion highlights the author's belief that in the United

States a healthier and less costly future can be brought about. He advocates a relative change of effort from the elaboration of high technology treatments and the replacement of body parts to the promotion of healthy life styles. While favouring a national strategy for the postponement of morbidity and believing such can be effective, the practical, resource and personnel difficulties associated with its implementation are recognised.

### **Comment**

This article reaffirms and refines the original theses that the United States age-survival curve will become increasingly rectangular and that late age-specific morbidity will decrease faster than mortality. Although some empirical evidence from clinical trials is reviewed, this indicates only that morbidity can be reduced by medication. Nothing is learnt about the general determinants of mortality and morbidity improvement, which the author himself recognises are substantially influenced by environmental and life-style factors. The article no more than touches on the main researchable question, the factors underlying the differential trends in mortality improvement among sub-groups of the population, e.g. males and females, racial groups or persons in various social and income groups. The best approach to improved forecasts is a better understanding of these differentials in large populations. Only an unprecedentedly huge clinical study could contribute to this knowledge.

### **NOTES**

Fries, J. F., Aging, natural death and the compression of morbidity. *New England Journal of Medicine*, **303** (1980), 130–36.

S. J. Olshansky, On forecasting mortality. *Milbank Quarterly*, **66**, 3 (1988), 482–530.

Given the many unanswered questions about recent improvements in late age mortality, it is prudent for population projection methods to be cautious in their assumptions about the future and essential that the forecasts are not misinterpreted as inevitable outcomes. Until recently official demographers in Britain, the United States and the United Nations Organisation have normally employed, for the assumptions in their population projection models, extrapolations of recent trends in

fertility and mortality. Future change has normally been damped down by assuming deceleration towards a target rate.

Olshansky's article provides a valuable discussion and detailed tabulation of the assumptions employed by the United States Bureau of the Census in fourteen population projection exercises from 1948 to 1987. His account of the pragmatic nature of the key parameters of projection models is lively: it is a corrective text for those who see population projections as authoritative predictions. Until recently it was assumed that the average life expectancy of 70 years observed in the 1960s was near the maximum possible. One result has been that the 1960s and 1970s projections consistently underestimated mortality improvements and therefore the numbers surviving into old age. Recently, however, the United States Social Security Administration have revised their assumptions, partly because it is now seen that mortality declines are fastest among those (white females) who have the lowest age-specific mortality rates. This challenges the notion that the population has reached an 'upper bound' to longevity.

The two latest United States forecasts have abandoned 'ultimate mortality rates' and substituted 'ultimate rates of mortality decline'. These have been determined by considering the development and application of new diagnostic, surgical and life-sustaining technologies, the presence of environmental pollutants, improvements in exercise and nutrition and the incidence of violence. Olshansky comments that these assessments use no systematic method and rely on personal judgements.

The article provides a valuable digest and commentary on the alternative or refined approaches to projecting mortality which have been developed in recent years. The most familiar are the complete or partial cause-elimination models, which transfer deaths from one (partially) eliminated cause to all other causes, usually but not necessarily delaying their occurrence. Other models model mortality improvement by delaying deaths from single causes or simultaneously from several causes; the great problems of understanding and modelling the interactions between different disorders are thereby tackled. Models which incorporate both the complete or partial elimination of specific causes of death and which attach lags to other causes are intricate and have demanding data requirements.

Olshansky's article has less distinctive sections on the public policy and expenditure debates associated with mortality and morbidity projections and ends with a brief review of attempts to forecast the prevalence of disability. He concludes, 'in spite of claims made by some that morbidity will decline, the complex relation between mortality,

morbidity and disability is just beginning to unfold, and it is too early to tell what the health and economic impacts or recent trends in these variables will be for both the United States and the rapidly aging global population' (p. 525).

### **Comment**

Discussions about population forecasting methodologies and particularly the mortality component have to date largely been confined to scholarly journals and professional groups. It would be of great benefit to the quality of public debate about the financial and social consequences of population ageing and health improvements if some of the main difficulties of understanding recent trends in mortality and morbidity, their interrelations, and their implications for projection methods, were more widely disseminated even among academic disciplines. As an accessible and concise discussion of the main issues, Olshansky's article provides a valuable resource. If read in public policy and journalistic circles, it might promote greater caution in the interpretation of elderly population forecasts.

Age Concern Institute of Gerontology,  
King's College London