



Healthy Aging Around the World: Israel Too?

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Abstract

Mortality rates have been falling at all ages, even for very old cohorts, in most western countries as well as in Israel. The question remains open as to whether morbidity rates are also decreasing, especially for Israel's elderly. While health is improving in almost all industrialized countries, the situation in Israel is not yet resolved. While the more recent cohorts of the young-old (65–74 years) are healthier than their predecessors, Israel's old-old (75+) may still be lagging behind other countries with regard to improvements in health status. This phenomenon is not well understood but could be explained in part by the more severe formative experiences of many of Israel's very elderly cohort.

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Aging and its consequences have become a global issue. During the twentieth century, a demographic transition occurred in the more developed regions, which most likely will impact upon the less developed regions in the future [1]. Israel's population over 65, currently standing at 10% (still not old in comparison with other industrialized countries), has nevertheless undergone both relative and absolute growth over the last few decades. This trend is expected to continue in the next half-century [2].

Most will agree that the healthier the elderly, the better. Some tantalizing early evidence, mainly but not exclusively from the United States, suggests that more recent elderly cohorts are actually healthier than previous ones. These observations support the predictions offered by Fries [3] and his school [4,5] about a "squaring of the curve" – in terms of both mortality and morbidity.

We present a brief overview of the evidence relating to this theory and examine the limited Israeli data addressing this question.

The theory

More than 20 years ago Fries [3] published a landmark article entitled "Aging, natural death and the compression of morbidity," in which he challenged the accepted notion that population aging necessarily causes an increase in the total burden of disability. This theory posits that, at least in the industrialized world, most people

would live long enough to begin to approach the maximal potential human life span and enjoy an improved quality of life. As such, the survival curve has become increasingly rectangular as more people surviving into their late seventies and early eighties are not only alive but remain relatively free of disability. As Kirkwood put it [6], "health span" is approaching the "life span." It should be pointed out that Fries' compression hypothesis was exactly that, and there has been some heated debate about whether or not this theory is indeed valid [7].

A sampling of the evidence

Cumulative disability

In 1998, Fries' group assessed whether persons with an initially lower prevalence of modifiable health risks developed more or less cumulative disability [8] over several decades. Their data strongly supported the compression theory, i.e., by the end of the study period those entering it with low health risks exhibited only half the cumulative disability of those with higher risks. Moreover, when disability did appear, its onset was postponed by more than 5 years in the low risk versus the high risk sample. The authors concluded that "Smoking, body mass index and exercise patterns in midlife and late adulthood are predictors of subsequent disability" [8].

However, there were some caveats [5,8]. First, the defined endpoints comprised relatively low levels of disability and did not include dementia. Also, the study did not address a more important and costly outcome: long-term institutional care. In addition, given the nature of the cohort (mainly white, well-educated males), generalizability was limited.

Most importantly, at age 75, this cohort was still too young to offer a definitive answer to the question at hand. As an editorial [5] pointed out, "At this age, average life expectancy is [still] about 10 years...and many in the cohort will survive past 85. Thus the years of greatest disability, when nursing home care is most likely to be required, still lie ahead." Follow-up results in an even older cohort are eagerly awaited.

The last year of life

Much of the financial burden of caring for the elderly may well relate to the *process* of dying, rather than to aging *per se*. As such, a different view of this same issue, but concentrating on the last year of life in an older cohort can be observed via an examination of data

from the 1986 and 1993 National Mortality Follow-Back Surveys, which comprised probability samples of all American deaths for elderly (65+) decedents [9]. As reported by next of kin, days of hospital admission and/or nursing home stays, functional disability, and duration of impairment in three cognitive measures were combined to derive an overall “sickness score.” Even in the last year of life, it appeared that old age in 1993 was a more salubrious process than for those who died just 7 years previously. For example, the study reported that women over age 65 utilized fewer hospital and long-term bed services. This was particularly the case for those in the old-old category (85+). Regarding function, the percentage of women older than 85 years with a restriction in at least two activities of daily living fell sharply from nearly two-thirds (62.5%) in 1986 to just over one-half (52.1%) in 1993.

Cognitive decline

The feared syndrome of dementia, as pointed out above, was not assessed in the study by Vita et al. [8] but was indeed examined in the Follow-Back Surveys [10]. Once again, for very elderly women dying in 1993, a higher percentage (56.2%) showed “normal cognitive function” in their last year of life than was the case for the 1986 decedents (50.3%) [9].

There are additional data suggesting that, at least in the U.S., the prevalence of dementia decreased during the 1990s. For example, Freedman and colleagues [10], comparing patients examined in health surveys in 1993 and again in 1998, found that the proportion of older people with “severe cognitive impairment” fell from 6.1% in 1993 to just over half that (3.6%) only 5 years later. These changes could not be attributed to demographic shift, socioeconomic factors or to changes in the prevalence of stroke, visual or hearing impairments. They concluded: “As a group, older persons, especially those well into their 80s, appeared to have better cognitive functioning today [towards the end of the decade] than they did in the early 1990s.”

Data from countries other than the U.S.

As most of the research in this field has emanated from the U.S., it is important to examine whether any corroborative data exist from other countries. For example, Jacobzone [11] investigated comparative health statistics from seven industrialized nations (Australia, Canada, France, Germany, Japan, New Zealand, the UK) as well as from the U.S. A few illustrative examples follow.

In examining trends in long-term institutionalization during the period 1980–1994, one observes an annual fall in Australia of 6% for the young-old (65–74 years) and 4.3% for those over age 80. A similar decline was noted in Canada (4.2% for those aged 65–69; 2.5% for those 70–74 years old; 1.1% for 75–79 years and 0.2% for 80 and over).

The underlying assumption here is that the fall in institutionalization rates is, at least in part, a result of the improving health of successive elderly cohorts. Other factors may also be at work, such as a reduction in government funding for such services, an increase in resources directed towards home healthcare, or secular/cultural changes. It is interesting, however, to note that these declines were observed across all countries and in most age groups studied.

Table 1. Trends in disability in households in three countries, selected years, women 1981–1995*

Country	Years	Age group	Annual change (%)
Australia	1981–93	65–69	-1.0
		70–74	+1.0
		75–79	-1.4
		80+	-2.1
Canada	1986–91	65–74	-5.2
		75–84	+1.3
		85+	-1.0
Germany	1986–95	65–69	-3.2
		70–74	-4.0
		75–79	-3.3
		80+	-1.5

* Modified from Jacobzone [11]

With regard to those still residing at home, Jacobzone also summarized data relating to trends in “disability in households” for the eight countries from 1975 to 1995. Here, again, there seems to be an across-the-board improvement in all countries in most age groups. Table 1 presents representative data from three of the eight countries studied.

From the Canadian province of British Columbia, Evans et al. [12] examined utilization data on acute hospital days, physician services and pharmaceutical use with respect to the elderly. They conclude that despite the dire predictions of some authors, changes in the age structure in that province “...have not been major contributors to trends in the per capita utilization of these three categories of health care services...” They go on to forecast that “...they will not be in the future.”

Israel: a country in demographic transition

Israel enjoys a well-developed national healthcare system. While it has created an increasingly sophisticated geriatrics infrastructure, especially with regard to acute and rehabilitative services, there are still problems in the organization of these services. There are also relatively few preventive and health-promotion initiatives directed at the elderly, and those that have been proposed await implementation [2]. Despite the dearth of substantive data, we have collated the few sources that do exist and have highlighted key trends.

Life expectancy

In the year 2000, life expectancy at birth for Israeli men was among the highest in the world (76.9 years). Although women’s life expectancy has reached an average of 80.9 years, this is still not as high as that in many other industrialized countries, with Israel ranking only 18th in the world [2,13]. However, more relevant to our question, during the period between 1975–79 and 1996–2000, life expectancy at age 75 rose by an impressive 20% for women (11.3 years) and 22.8% for men (10.2 years) [13].

With regard to certain maladies, such as heart disease for example, a steady decrease in age-adjusted mortality has been apparent (in the Jewish population) since at least 1979. The average

annual age-adjusted decline in mortality rates from all heart disease fell by approximately 1.5% for men and 1.9% for women during this period. Age-adjusted mortality secondary to myocardial infarction has decreased even more quickly, with Jewish males and females exhibiting a 9.6% and 6.4% decline, respectively [14].

Perhaps indicating primarily but not exclusively an improvement in medical technology, the 7 day case-fatality rate for myocardial infarction fell from 10.2% in 1990 to 6.3% in 1996. Furthermore, one year case-fatality fell from 22.5% to 13.8% [15]. Similar trends have also been observed for mortality from stroke. For example, in the decade 1985–1995, the average annual percentage decrease in age-adjusted stroke mortality was 0.6% for Jewish men and 2.6% for Jewish women [14]. Among other influences, a plausible etiologic explanation for some of these improvements lies in the fact that the prevalence of cigarette smoking among the elderly fell from 13.5% to 10.2% between 1985 and 1997 [16].

Disability in ADL

While it is evident that Israelis are living longer, are they indeed living better? Of interest is the fact that one of the strongest predictors of life expectancy is the degree of disability in the population. Based on the limited data available from a survey of long-term care institutions as well as from two well-executed community surveys of the elderly undertaken in 1985 and 1997 [16], one observes a somewhat mixed picture. In contrast to other western countries, overall for those over the age of 65, total disability rates have not declined in Israel. For example, overall disability rates of 11.3% were observed in 1985, rising to 13.3% in 1995. That being said, it appears that there are data supporting the notion that at least for cohorts of the “young-old,” improvement is evident. For example, among people aged 65–74, the percentage of those disabled in at least one ADL fell from 6.7% in 1989 to 4.5% by 1997.

What could explain the anomalous differences in function between the old-old and young-old cohorts in Israel? Although speculative, it could be that since the very elderly Israelis include a high percentage of Holocaust survivors and war refugees, they may have been more damaged, both physically and mentally, in their youth. As such, they may manifest a less successful old age than the cohort following them who were less traumatized.

In addition, it is difficult to fully compare the two data sets referred to above regarding our study question. Among other differences, in the first survey there was a high rate of dropouts and proxies were not interviewed. This was not the case in the second study where this methodologic problem was more successfully dealt with. As such, disability may well have been underestimated in the earlier study such that the relatively similar percentages of disability in 1985 and 1995 may actually represent an improvement in the functional disability level of Israel's elderly.

Self-reported health

Both of the aforementioned surveys queried respondents on their perception of their health status, an assessment known to be an

accurate measure of overall health. Here, clear evidence of improvement over time is manifest in Israel. For example, in both the young-old (65–74 years) and old-old (75+), fewer complained of “bad health” in the second survey as compared to the first (decreasing from 19% to 12.9% and 26.7 to 21%, respectively).

Education and economic situation

As pointed out above, while not measures of health *per se*, both educational attainment and higher economic status are associated with (and in part contribute to) enhanced health. In both these domains there have been clear improvements in Israel. For example, in 1961 slightly more than a third (34%) of the elderly in Israel lacked any formal education. In contrast, by 2001 this number had fallen to only 13% [13]. At the other end of the spectrum, 26% of today's elderly have a post-secondary education, compared to just 7% with such qualifications in 1961.

With regard to economic status, while many of Israel's elderly still suffer from poverty, there has been some improvement in this domain as well. For example, the proportion of older citizens receiving government income supplements has fallen by more than half over the past two decades from 36% in 1980 to 16% in 2001. Also, among the non-immigrant elderly, the proportion that receives a pension from previous employment has risen from 31% in 1985 to 42% in 1997 [17].

Institutionalization

As was shown for the disability data, the picture here is also somewhat mixed. On the one hand, the average age of those (veteran Jews only) entering long-term care institutions has risen significantly from 79.6 years in 1983 to 84 years in 1999. Also, for the young-old (65–74 years), as observed in many other developed countries, there has been a steady decline of 9% in the rate of institutionalization between 1983 and 1999. On the other hand, reflecting the differences between the old-old and young-old cohorts discussed above, for those over 75 there has been a significant rise of 16% per year in institutionalization during this period [18].

In this context, it is interesting to note that the decline in institutionalization rates (at all ages) that have been carefully documented in the U.S. and elsewhere has also shown a much more significant decrease in the young-old than in those over age 80 [19]. Conceivably, at least in part, the Israeli data indicating an increase in the institutionalization rate in the old-old may be due to a catch-up effect. Until recently, compared to many other developed countries, Israel has had to manage with quite a low per capita rate of long-term care nursing-home bed availability [20]. Consequently, there may well have been many very elderly requiring such admission but who could not access it until the beds had become available. If this hypothesis is correct, and trends observed elsewhere carry over to Israel, we should begin to see a plateau and even a fall in these rates in the next few years [18].

Discussion

In most developed countries, not only is there a decline in mortality, even into very old age, but there has also been a trend

ADL = activities in daily living

towards increasingly good health and function in successive cohorts of the elderly. What is happening in the less developed regions around the world is less well known. There is no guarantee that there is (or will be) a compression of morbidity in those countries for the foreseeable future, especially without an improvement in health services, education and income.

The trend in Israel, a country still somewhat younger demographically than those in which these positive trends have recently emerged, seems promising. However, it is still not uniformly clear in which direction or to what extent these changes will occur.

Even in the developed countries we can only surmise the reasons for these trends [4]: some combination of a rise in socioeconomic status, increasing adoption of healthy behaviors, as well as an improvement in medical technologies. There may also be secular trends – as yet poorly characterized and even less well-understood – to explain part of the variance. The precipitous fall in tuberculosis mortality that began more than a century before the advent of antibiotics presents an intriguing analogy [21].

Recent improvements in the health of Israeli elderly may relate primarily to improvements in both income and education. As has long been known, for every age group (including the elderly), health status is in large part dependent upon income. For example, a 13 year gap in women's life expectancy and a 16 year gap for men's is evident when comparing counties with the lowest and highest income rates in the United States [22]. Similarly, in Holland, a 13 year gap in disability-free life expectancy has been observed between the affluent and those most deprived [23].

As pointed out by Evans and co-workers [24], historical analyses have indicated that "...although risk factors for ill health change over time, they tend to cluster disproportionately within the lower ends of the social hierarchy. In other words, the better off, more educated, more powerful and wealthier in society have much greater capacity to improve their health than do the less well-off – a pattern that has been sustained over time and across place."

None of the above data should be utilized to justify or support a withdrawal or reduction in health and social services from the frail elderly in any jurisdiction. This is especially the case in Israel, where an economic crisis recently put social and health services under enormous pressure. Furthermore, as noted above, geriatric services in Israel still require improvement in their organization and an augmentation of programs devoted to prevention and health promotion. Along with an increase in the absolute numbers of "healthy" aging persons, there will continue to be a substantial minority with very real health needs. Acute, rehabilitative and long-term care must continue to be supported, lest we see a downgrading in the quality and quantity of necessary services for those elderly patients who require them, as was recently observed in Britain [25].

Moving on to the "dismal science" of economics, even if future cohorts of the elderly turn out to be healthier than their predecessors, Jacobzone [11] notes that "Better health can be acquired through better lifestyles but is also the result of timely and appropriate access to new technologies." And he goes on to warn us that "...the diffusion of [such] technology has been identified as one

of the major factors driving health care costs upward...The main question is whether older persons who survive longer will need even more services to maintain their quality of life...there is wide evidence that severe disability can be avoided only with the use of supportive services and assistive technologies."

Finally, another, more whimsical, perspective can be found in an excellent historical analysis of longevity, which quotes the redoubtable George Bernard Shaw. From the preface to his book *The Doctor's Dilemma*, he enjoins us to "...use your health, even to the point of wearing it out. That is what it is for. Spend all you have before you die; and do not outlive yourself. Do not try to live forever. You will not succeed."

Conclusion

Aging is here, in both the developed and in the developing world, as well as in Israel. It will not go away – nor will the elderly. In this paper we have tried to show that in many industrialized countries and perhaps in Israel as well (at least for the young-old cohort alive today), there exists mounting evidence that many of today's elderly are indeed healthier than those of previous cohorts. It will require further study to corroborate and understand the extent of this phenomenon in Israel. The implications – in either direction – are significant. Regardless of whether recent improvements in health status continue and whether or not these developments lead to "savings," we clearly owe it to the elderly to try to improve their quality of life. We should do so, if not for them, then at least for ourselves, as most of us will (barring the occasional accident) get there in the end.

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Capsule

Confronting the avian influenza threat

Stephenson et al. addressed the problem of a possible avian influenza pandemic. Sporadic human infection with avian influenza viruses has raised concern that reassortment between human and avian subtypes could generate viruses of pandemic potential. Vaccination is the principal means to combat the impact of influenza. During an influenza pandemic the immune status of the population would differ from that during inter-pandemic periods. An emerging pandemic virus will create a surge in worldwide vaccine demand, and new approaches in immunization strategies may be needed to ensure optimum protection of unprimed individuals when vaccine antigen may be limited. The manufacture of vaccines from pathogenic avian influenza viruses by traditional methods is not feasible for safety reasons as well as

technical issues. Strategies adopted to overcome these issues include the use of reverse genetic systems to generate reassortant strains, the use of baculovirus-expressed hemagglutinin or related non-pathogenic avian influenza strains, and the use of adjuvants to enhance immunogenicity. In clinical trials, conventional surface antigen influenza virus vaccines produced from avian viruses have proved poorly immunogenic in immunologically naive populations. Adjuvant or whole-virus preparations may improve immunogenicity and allow sparing of antigen.

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E. Israeli

Capsule

Memory storage sites

The formation of declarative memories involves changes in synaptic plasticity within structures of the medial temporal lobe, including the hippocampus. However, the hippocampus has a time-limited role in long-term memory storage; other structures eventually become capable of independently supporting the retrieval of remote memories. Maviel et al. combined brain imaging of activity-dependent genes with region-specific neuronal inactivation in mice submitted to either recent or remote memory testing. Specific neocortical association areas (prefrontal, anterior cingulate, parietal, and retrosplenial) mediated long-term spatial memory formation with distinct functional neuronal mechanisms underlying neocortical reorganization during memory consolidation. Inactivation of each of the identified areas led to impairment of remote memory retrieval, whereas recent memory retrieval was spared.

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