DISABILITY LIFE EXPECTANCY FOR THE ELDERLY, CITY OF SÃO PAULO, BRAZIL, 2000: GENDER AND EDUCATIONAL DIFFERENCES

MIRELA CASTRO SANTOS CAMARGOS, CARLA JORGE MACHADO and ROBERTO DO NASCIMENTO RODRIGUES

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DISABILITY LIFE EXPECTANCY FOR THE ELDERLY, CITY OF SÃO PAULO, BRAZIL, 2000: GENDER AND EDUCATIONAL DIFFERENCES

MIRELA CASTRO SANTOS CAMARGOS, CARLA JORGE MACHADO AND ROBERTO DO NASCIMENTO RODRIGUES

Departamento de Demografia/Cedeplar/UFMG – Minas Gerais, Brazil

Summary. There is evidence that ‘health life expectancy’ (expected number of years to be lived in health) differs by socioeconomic status. Time spent in health or disability plays a critical role in the use of health care services. The objective of this study was to estimate ‘disability life expectancy’ by age, gender and education attainment for the elderly of the city of São Paulo, Brazil, in the year 2000. Data came from the SABE database, population censuses and mortality statistics (SEADE Foundation). Life expectancy with disability was calculated using Sullivan’s method on the basis of the current probability of death and prevalence of disability by educational level. The prevalence of disability increased with age, for both sexes and both levels of educational attainment studied. Men showed a lower prevalence of disability, in general, and persons with lower educational attainment showed a higher prevalence of disability. Regarding life expectancy, women could expect to live longer than men, with and without disability. For both sexes, the percentage of life expectancy lived with disability decreased with increasing educational attainment. With increasing educational attainment, the sex differences in the percentage of remaining years to be lived with disability increased for most ages. Finally, the percentage of remaining years to be lived with disability increased with age for males and females, except for males with high educational attainment between the ages 70–75 and 75–80. The results may serve as a guide for public policies in the country, since health problems faced by older persons, such as disability, are the result of a number of past experiences during their life-times, such as health care, housing conditions, hygiene practices and education. Education influences health behaviours and is related, to some extent, to all these factors. Therefore, improvements in education for the disadvantaged may improve health.

Introduction

Brazil has experienced a decline in mortality rates and an increase in life expectancy in recent years (Finger, 2003; Duarte et al., 2002). This trend has raised questions
related to the quality of the expected number of years that an individual is about to live. Several methods have been developed to calculate the expected number of years to be lived in health (healthy life expectancy) and with functional disability (disability life expectancy), i.e. with difficulty in doing or inability to do simple tasks of daily life (Crimmins et al., 1994).

Healthy life expectancy and life expectancy have similar interpretations. The difference is that healthy life expectancy refers to the number of years that a person of a given exact age can expect to live in a healthy condition, given that a certain set of morbidity and mortality rates do not change over time (Jagger, 1999). It can be measured by multiple decrement and multistate methods that use longitudinal data, or by the Sullivan method which uses current prevalence data. Indeed, the Sullivan method has been used the most (Bone et al., 1998; Jagger, 1999; Robine et al., 1999; Manton & Land, 2000; Portrait et al., 2001). In Brazil, some studies have made use of period data and applied the Sullivan method to calculate the healthy life expectancy (Instituto Brasileiro de Geografia e Estatística, 2003; Baptista, 2003; Santos, 2003; Camargos, 2004).

Evidence exists that life expectancy does not differ only by health status, but also differs by socioeconomic level (Bossuyt et al., 2004). A proxy for socioeconomic level is educational level. The use of education to measure socioeconomic status is explained by the fact that it is considered the main indicator of socioeconomic status in the life cycle (Crimmins & Saito, 2001). In the Brazilian context, the use of education as a proxy for social and economic status is considered appropriate, since Brazil has one of the highest wage returns to education in the world (Menezes-Filho, 2001).

Therefore, the objective of the present study is to estimate life expectancy with functional disability by age, sex and educational attainment in the elderly in the city of São Paulo, Brazil, in the year 2000.

**Methods**

To estimate life expectancies decomposed by the presence or absence of functional disability, the Sullivan method was used (Sullivan, 1971). The prevalence of functional disability in the sample population was combined with information on mortality of the population for the year 2000. To generate the life table, mortality rates for six age groups – $M_x$ for ages 60–64, 65–69, 70–74, 75–79, 80–84, and 85+ – and the prevalence of functional disability for the same age groups were needed. Mortality information was available by age and sex and information on prevalence was available by sex, age and educational status.

Given the assumption that the mortality observed in the period could be applied to a given cohort, the current set of $M_x$ were applied to the population of the city of São Paulo in the year 2000; they were calculated based on the mid-year population for the city (denominator), by age and sex, and from the deaths that took place in the same year. The estimated elderly population for the mid-2000 (i.e. 1st July 2000) was obtained by applying the exponential growth formula (Preston et al., 2000) to the populations reported in the censuses of September 1991 and August 2000, which are generally held to be reliable (Machado, 2002). The deaths for the population were obtained from the Fundação Sistema Estadual de Análise de Dados (SEADE
The prevalence of functional disability by age, sex and educational level was estimated based on information on activities of daily living (ADL) in the city of São Paulo as part of a project called Health, Well-being, and Aging in Latin America and the Caribbean (the SABE project) which collected information on the elderly of seven countries from Latin America and the Caribbean: Argentina, Barbados, Brazil, Chile, Cuba, Mexico and Uruguay (Peláez et al., 2003). In Brazil, home interviews were conducted with a sample of 2143 elderly persons between January 2000 and March 2001. These persons were all in the city of São Paulo. Those in institutions were not included (Lebrão & Duarte, 2003).

It is important to note that São Paulo is the largest city of Brazil and has seen a large number of internal and international migrants since the nineteenth century. Therefore, São Paulo tends to reflect realities of different parts of Brazil and can be considered more representative of Brazil as a whole, compared with any other city (Machado, 2002).

The available activities of daily living present in the SABE questionnaire and considered in this study were: dressing, eating, bathing, using the toilet, lying down on the bed and getting up from it, and walking across a room. Functional disability was defined in the present study as difficulty in performing one or more of the activities of daily living and individuals were classified as with or without functional disability.

Regarding education, there is no established way to deal with categorization of numbers of school years in the literature that concerns healthy life expectancy; it varies with country or region of study. In the present study two educational groups were used: less than five years of schooling and five years or more. In fact, on average, the elderly household-head in the city of São Paulo has 5·7 years of schooling (Instituto Brasileiro de Geografia e Estatística, 2000). It was assumed that those individuals who did not respond or did not know their number of years of schooling (thirteen individuals or 0·6% of the sample) did not have any schooling; they were, therefore, included in the first group.

Information on prevalence by sex, years of schooling and educational levels were processed using the software SPSS version 11·5. Weights were used since the oldest elderly group was oversampled (643 individuals or 30% of the sample). The weights were available in the SABE database.

Two life tables were constructed, one for each sex. The number of person-years lived within each age group in the life table was distributed according to the prevalence in each specific age group. The disability-free life expectancy (DFLE) and disability life expectancy (DLE) were computed given the number of person-years lived in each age group with and without functional disability. Therefore:

\[
DFLE_x = \frac{\sum (l - m\pi x) L_x}{l_x}
\]

and

\[
DLE_x = \frac{\sum (m\pi x) L_x}{l_x}
\]
where $DFLE_x$ is the average number of years that an individual will live without functional disability, starting from exact age $x$; $DLE_x$ is the average number of years that an individual will live with any functional disability, starting from exact age $x$; $\pi_x$ is the prevalence of functional disability for individuals aged $x$ to $x+n$; $\mu L_x$ is the total number of years expected to be lived for individuals aged $x$ to $x+n$; and $l_x$ is the survival probability to exact age $x$.

A limitation of the present study is the fact that age-specific mortality rates, by educational groups, could not be used, since there is no information on mortality by education. Therefore, the assumption made was that subjects with different educational levels had the same life expectancies. However, even if the total life expectancies were different by educational groups, this would not affect the overall results of the present study, since the inferences made here are based on the percentage of years that remains to be lived in disability at each exact age, not on the absolute number of years. It is also important to note that the estimates obtained in this study were based on disability prevalence data and mortality rates for the year 2000, and the inferences were based on the assumption that they would be constant over time.

Also, the method used does not allow the assessment of transitions from one health state to another. In reality, there exists at least two states (disability and disability-free) but in order to analyse data considering that people can exit one state and enter another one and re-enter the first state (multistate model), longitudinal data of incidence were needed. However, previous studies have shown that if there are no sudden changes in the prevalence and mortality rates over time, the Sullivan method gives valid conclusions (Mathers & Robine, 1997).

**Results**

The weighted prevalence of disability increased with age, for both sexes and both levels of educational attainment studied, even though some oscillations were noticed (Table 1), given that numbers of cases were small. A comparison between men and women of the same educational attainment revealed that men showed a lower prevalence of disability, with the exception of those of higher educational attainment in the age groups 70–74 and 80–84. Besides, persons with lower educational attainment had a higher prevalence of disability.

Estimates indicated that, in the year 2000, elderly women from the city of São Paulo could, on average, expect to live longer than men (Table 2). At age 60, as an example, the life expectancy was 17·6 and 22·2 among males and females, respectively. The difference between sexes was about five years at age 60, but it decreased with age, and it was about one year at age 85. For elderly men, at every exact age, women could expect to live more years with and without disability (Table 2), except in the case of disability-free women in the last two age groups (80 and 85).

Especially for men, the percentage of life expectancy lived with disability decreased with increasing educational attainment, at every exact age. At age 60, for men with a low educational attainment, men could expect to live 81% of their remaining time in good health; this percentage increased to 91% for men with high educational attainment. These figures were 57% and 81%, for men at age 85, respectively. For women they were, respectively, 72% and 83% at age 60, and 41% and 61% at age 85.
With increasing educational attainment, the sex differences regarding the percentage of remaining years to be lived with disability increased for all exact ages except 70. At age 60, for low educational attainment, the percentage of years lived with disability for women was 47% higher compared with the percentage for men (28% for women versus 19% for men); for high educational attainment, the percentage was 88% higher (17% for women versus 9% for men).

Finally, it is noticeable that the percentage of remaining years to be lived with disability increased with age for males and females, except for males with high educational attainment between age 70–75 and 75–80.

**Discussion**

The differential mortality by sex has been pointed out as the main explanatory factor for differences in life expectancies by age (Berquó, 1996). In the present study, elderly women not only showed a higher life expectancy, but also could expect to live a higher number of years disability-free. However, a higher percentage of the years that remained to be lived by women at each age, were expected to be lived in disability, compared with men. These findings are corroborated by previous studies (Agree, 1999; Instituto Brasileiro de Geografia e Estatística, 2003; Baptista, 2003; Camargos, 2004; Santos, 2003; Zimmer, 2005). It could be argued that differentials in the perception of health between men and women could be responsible for the differences observed, since women tend to declare a higher number of morbidities relative to men and to be more self-conscious about their health status during all the life cycle.
Table 2. Male and female life tables. Number of years to be lived with disability and disability-free, by sex; percentage of years to be lived with disability and disability-free, by sex and educational attainment

<table>
<thead>
<tr>
<th>Sex</th>
<th>Exact age</th>
<th>Life expectancy</th>
<th>Percentage of life expectancy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>Disability-free</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disability-free</td>
<td>With disability</td>
</tr>
<tr>
<td>Males</td>
<td></td>
<td>60</td>
<td>17.62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>65</td>
<td>14.47</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70</td>
<td>11.72</td>
</tr>
<tr>
<td></td>
<td></td>
<td>80</td>
<td>7.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>85</td>
<td>5.82</td>
</tr>
<tr>
<td>Females</td>
<td></td>
<td>60</td>
<td>22.18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>65</td>
<td>18.38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70</td>
<td>14.86</td>
</tr>
<tr>
<td></td>
<td></td>
<td>80</td>
<td>8.89</td>
</tr>
<tr>
<td></td>
<td></td>
<td>85</td>
<td>6.81</td>
</tr>
</tbody>
</table>

Sources: Population censuses 1991 and 2000, Brazil (IBGE); SABE database (2001); SEADE foundation (2001).
(McDonough & Walters, 2001). Also, higher mortality rates for men, compared with women, at younger ages could lead to a selection in the senior years. Therefore, those men who survive to older ages could be, in fact, the 'strongest ones' (Perls et al., 2002) and the composition at each age group of women, compared with men, would be less homogeneous, with a higher percentage of frail elderly women, which would result in a higher percentage of years with functional disability for women.

Regarding differentials by sex and education, even though it was not possible to assess the number of years lived by each group of women by education, the findings of the present study are in agreement with previous studies that pointed out that subjects with low educational attainment could expect to live a higher percentage of their remaining years in disability or in poor health (Valkonen et al., 1997; Sihvonen et al., 1998; Martínez-Sánchez et al., 2001; Bossuyt et al., 2004).

A comparison of the different levels of educational attainment revealed that the differences in life expectancies in disability were higher for women (except for age 70), a finding that is also corroborated by previous studies (Valkonen et al., 1997; Bossuyt et al., 2004). As already mentioned, this group of women are expected to be more frail than men at the same age.

It is important to stress that investments in health care and advances in medicine can allow a decrease in prevalence rates, which can result in higher rates of cure or the decrease in disability rates. Also, mortality rates can decrease and people may live not only longer, but also live longer in good health, a trend that has been observed in previous studies (Doblhammer & Kytir, 2001). If this is the case, the estimates of the present study will not necessarily be observed in the years to come.

The present study used data from the city of São Paulo and the results obtained cannot be fully generalized. However, the results may serve as a general guide for public policies in Brazil. Indeed, it is well known that health problems faced by older persons, such as disability, are a result of a number of past experiences during their life-times, such as health care, housing conditions, hygiene practices and education. Education influences health behaviours and it is related, to some extent, to all factors mentioned. Therefore, improvements in education for the disadvantaged certainly promote better health.

References


