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# Costa Rica: Subjective Survival Expectations versus Self-Rated Health Status

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Abstract

**Purpose**: The main objective of this study was to investigate whether subjective survival expectations in a developing country were as good as predictors of mortality as they have shown to be in other contexts.

**Design and Methods**: Data for this study was drawn from the first wave of the Costa Rican Longevity and Healthy Aging Study (2004-2006), a nationally representative sample of non-institutionalized adults over 60 years of age (N = 3000). Parametric Gompertz regressions were used to model mortality stratifying by gender and age (60-69 and 70-89). The first of the six models estimated included subjective survival expectations but not self-rated health status. The second included self-assessed health status but not subjective survival expectations. The third model included both variables. The last three models were similar to the first three, but each of them included four body functioning biomarkers. All models were adjusted by sociodemographic, health-related and health-related behavior variables.

**Results**: Only among males aged 60 to 69, subjective survival expectations were independent mortality predictors in models that may or not include body functioning biomarkers ($p < 0.05$ and $p < 0.1$ respectively). Results also suggested that subjective survival may be mediating the effects of objective measures of health status on mortality, and not just mediating the effects of self-assessed health status on mortality.

**Implications**: Differences between underlying mortality risks and those perceived by individuals can be employed to establish effect of external health shocks on updating self reported health status as well as potentially significant behavioral changes.

*Keywords*: body functioning biomarkers, mortality, developing countries

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Self-rated health status expresses a combination of specific information on health problems, physical functioning, and health-related behaviors (Quesnel-Vallée, 2007). Although related to self-rated health status, subjective survival expectations may be capturing something more than current health conditions (Popham & Michell, 2007) such as, for example, genetic or hereditary factors (Hurd & McGarry, 1995; Perozek, 2008), environmental and behavioral risk factors that are not made evident by survey questionnaires (Perozek, 2008), and health changes over time (Benítez & Ni, 2008). Self-rated health status has shown to be an independent predictor of mortality in a fair number of studies even when including other relevant covariates such as objective health status indicators (Idler & Benyamini, 1997). Even though research on subjective survival expectations is much less abundant than research on self-rated health status, like self-rated health status subjective survival expectations have shown to be a significant mortality predictor after controlling for sociodemographic factors and health-related conditions (Elder, 2007; Hurd, McFadden, & Merril, 1999; Hurd & McGarry, 2002; Smith, Taylor, & Sloan, 2001). Subjective survival expectations may be conceptually related to self-rated health but they are not the same (Hurd & McGarry, 1995) and have shown to be independent predictors of mortality (Siegel, Bradley, & Kasi, 2003; van Doorn & Kasl, 1998).

On aggregate, subjective probabilities of survival behave as population probabilities do and covary as expected with other variables such as socioeconomic status and smoking (Hurd and McGarry, 1995). In addition, survival expectations are consistent with observed survival patterns (Smith et al., 2001). Hurd and McGarry (1995 and 2000) analyzing the first (1992) and second (1994) Health and Retirement Study (HRS) wave, found that on average the probabilities of living to age 75 as well as of living to age 85 were closer to the corresponding averages from the US 1990 life table, particularly the values of the probabilities of surviving to age 75. Hurd and McGarry (2002) showed that those who survived from the first to the second HRS wave reported in the first wave probabilities of surviving to age 75 that were about 50% greater than those who died between waves. However, they also found that contrary to what was expected, individuals reported lower survival probabilities in the second HRS wave than they did in the first one. Smith et al. (2001), with data drawn from the first four HRS waves, also found that longevity expectations seem to predict future mortality reasonably well. Addressing Hurd and McGarry's (2002) inconsistent findings, their results show that for those who died between waves three and four, longevity expectations on average decreased monotonically until death. On the contrary, for those who survived, the probabilities were constant over the first three waves and on average they were higher than the average probabilities reported by those who died. Similar results were obtained analyzing those who died between the second and third waves. The authors concluded that the "evolution of subjective probabilities does appear to include an expectational component that may incorporate unobservable features of personal circumstances that bear on survival to age 75" (Smith et al., 2001, p. 1131).

Hamermesh (1985) reported that compared with actuarial estimates, individuals slightly underestimated short-term survival probabilities and overestimated long-term survival probabilities. Hamermesh suggested that when estimating subjective survival, people extrapolate changes in life tables because they are aware of the current levels of the tables and its possible improvements. Similarly, based on the 1992-2004 HRS data (individuals aged 50-64), Elder (2007) found that on average respondents were pessimistic about their survival to relatively young ages and optimistic regarding their survival to more advanced ages (particularly 85 and more). However, this same study showed that survival probabilities predicted in-sample mortality well at ages less than 65 (but less so past age 65). Overall Elder stated that, despite its shortcomings, not only subjective survival probabilities predict actual mortality, but as Popham and Mitchell (2007) stated they might contain information that is captured neither by self-reported health status nor by objective measures of health limitations.

Hurd and McGarry (2002) found that for individuals aged 46-65 both self-rated health status and subjective survival expectations were independently associated with mortality for the period window between the first and second HRS waves in a model controlling for sex and other sociodemographic characteristics and objective measures of health. However, using data drawn from the first HRS wave for individuals aged 51-61 and a follow-up period of three years, Siegel et al. (2003) found that among both males and females, independently of the inclusion or not of self-rated health status in the model, subjective survival probabilities were not related to the risk of death. Using data drawn from the first wave of the Assets and Health Dynamics among the Oldest Old (AHEAD) study (individuals 70 years or older) with a follow-up period of two years, Siegel and colleagues found that among females as well as among males the relationship between both subjective survival expectations and self-rated health status and mortality was statistically significant when one or both measures were in the model. Van Doorn and Kasl (1998) using data drawn from the Australian Longitudinal Study of Aging (ALSA) studied parental longevity and self-rated life expectancy as predictors of mortality among individuals aged 70 or older. They obtained similar results to the ones obtained by Siegel and colleagues with data drawn from the AHEAD study but only for males.

The role of self-rated health status as a predictor of mortality has been studied using data from both developed (Kawada, 2003) and less developed countries (Frankenberg & Jones, 2004). In contrast, the majority of research done on subjective survival expectations as predictors of mortality has been conducted using data from developed countries. The main objective of this study is to investigate whether subjective survival expectations in a developing country, Costa Rica, are as good as predictors of mortality as they have shown to be in other contexts. Unlike previous research jointly assessing subjective survival expectations and self-rated health status, the present study incorporates body functioning biomarkers as objective measures of health status and thus goes a step further than studies that only control for self-reports of health and medical conditions.

## Data Methods

### Data

Data for this study is drawn from the Costa Rican Longevity and Healthy Aging Study (CRELES). The CRELES study is a national representative longitudinal survey of individuals born before 1946 designed to study older Costa Rican adults' longevity and quality of life as well as its determinant factors. The original study sample consists of 3,000 respondents living in households (Rosero-Bixby, Fernández, & Dow, 2005). The present study analyzes data from the first CRELES wave (data collected between November 2004 and September 2006). From the 2,827 respondents 60 years old and over that were interviewed 2,515 of them were measured by trained professionals to obtain different anthropometric measures, including height and weight.

The CRELES study also provides information over a set of biomarkers including peak expiratory flow and handgrip strength among others. Respondents 90 years old and over (oversampled by design) were not asked the subjective survival question and therefore are not part of our population of interest. There are 2,549 individuals aged 60-89 in the original CRELES sample. CRELES respondents' vital status was followed by linking the dataset to the Costa Rican Civil Registry. Through May 2008, 326 deaths were registered to individuals in the age range 60-89.

**Statistical Method for Studying Mortality**

The CRELES study provides information regarding the exact date of entry into the study and the date of exit from the study, which is either the date at death or the final date of the follow-up period. Using this information I estimated a parametric Gompertz model, which expressed in the proportional hazard metric assumes the following form (Cleves, Gould, & Gutierrez, 2002, p. 213):

$$h(t/x_j) = h_0(t)\exp(x_j\beta_x)$$

The baseline hazard being:

$$h_0(t) = \exp(\gamma t)\exp(\beta_0)$$

Therefore,

$$h(t/x_j) = \exp(\gamma t)\exp(\beta_0 + x_j\beta_x)$$

$\gamma$ is the parameter to be estimated and $x$ is a vector of variables containing information on each individual $j$.

Vector $x$ includes a set of sociodemographic variables (age, education, marital status, income and wealth, and urban or rural residence), a set of health-related variables (chronic diseases, unintentional weight loss, hospital stays, functional limitations, and depression), and a set of health-related behavior variables (Body Mass Index, smoking, and drinking alcoholic beverages).

**Analytic Strategy**

For each gender, the analysis considers two age groups, one composed of individuals aged 60-69 and the other composed of individuals aged 70-89. The main reason for this age stratification is that individuals under 70 are asked to estimate the likelihood that an event (death) will not occur within a window period ranging from 10 to 20 years, depending on the respondent's age; whereas for individuals older than 70 the event the window period ranges between 10 and 15 years.

I estimated six models. The first model includes in vector $x$ the variable associated with self-assessed chances to survive to a target age (ten years or more than current age). The second model does not include the variable associated with subjective survival, but includes the variable associated with self-assessed physical health status. The third model includes both the variable associated with subjective survival expectations and the variable associated with self-assessed health status. The fourth, fifth, and sixth models are similar to the first three, but in these three cases vector $x$ also contains a set of four body functioning biomarkers (handgrip strength, peak expiratory flow, speed picking up a pen from the floor starting in a standing position, and walking speed starting in a sitting position). These biomarkers have shown to be strong mortality predictors among the elderly (Cesari et al. 2009; Cook et al., 1991; Lennartsson & Silverstein, 2001; McGinn et al., 2008; Rantanen et al., 2003; Rolland et al., 2006; Sasaki et al., 2007; Al Snih et al., 2002).

## Measures

**Subjective Survival Expectations**. Subjective survival expectations were assessed by the question: “How likely do you think it is you will live until age 80 (if the respondent’s age is less than 69 years old)? 85 (if the respondent’s age is between 70 and 74 years old)? 90 (if the respondent’s age is between 75 and 79 years old)? 95 (if the respondent’s age is between 80 and 84 years old)? 100 (if the respondent’s age is between 85 and 90 years old)?” The response categories were (1) Very Likely, (2) Likely, (3) Unlikely, and (4) Very Unlikely.

**Self-Rated Health Status**. Self-rated health status was assessed by the question: “Would you say your health is excellent, very good, good, fair, or poor?” The response categories ranged from (1) for excellent to (5) for poor.

**Objective Measures of Physical and Mental Health**. The model includes an index of chronic conditions that represents the number of self-reported diagnosed chronic conditions (range = 0 – 8). These conditions are heart disease, infarction, stroke, cancer, lung disease, arthritis, hypertension, and hypercholesterolemia. The model includes a dichotomous variable indicating whether the respondent had any overnight hospitals stay during the last year (1 = yes, 0 = no). Another physical health indicator is a dichotomous one for unintentional weight loss during the last year (1 = yes, 0 = no). The model also includes a mental health indicator. This indicator is based on the fifteen-item short form of the Geriatric Depression Scale. Its value is zero if the respondent shows between zero and four depression symptoms, it is one for mild depression, if the number of depression symptoms ranges from five to nine, and two for moderate or severe depression, if the number of depression symptoms ranges from 10 to 15 (Almeida & Almeida, 1999).

**Functional Limitations**. Functional limitations were accounted for the index of Physical Functioning (PF) and the Instrumental Activities of Daily Living (IADL) indexes. The PF index (range = 0 - 9) counts difficulties in any of the nine following activities: walking several blocks, climbing several flights of stairs, pushing or pulling a heavy object, walking across a room, bathing, eating, getting in or out of bed, going to the toilet, and cutting the toenails. The IADL index (range = 0 – 4) counts difficulties in any of the four following activities: taking medication, handling money, shopping, and preparing meals.

**Health-Related Behaviors**. As mentioned before, the CRELES study provides height and weight measures obtained by trained professionals. These measures were used to calculate Body Mass Index (BMI = (weight in kilograms / (height in meters)$^2$ ). The model includes BMI and BMI squared. In addition two dichotomous indicators are included, one for currently smoking cigarettes (1 = yes, 0 = no) and one for drinking alcoholic beverages (1 = drinks alcoholic beverages either on daily basis or occasionally, 0 = used to drink in the past or never drinks).

**Body Functioning Biomarkers.** The model includes four biomarkers. The first one is handgrip strength. The variable associated with this biomarker (range 0 – 3) has a value zero if the respondent's handgrip strength is in the fourth quartile of the handgrip distribution for males and females respectively; has values one to three if handgrip strength is in the third, second, or first quartile respectively and it also has value three if handgrip strength could not be measured. The second biomarker is peak expiratory flow (PEF) (range 0 – 3). The variable associated with PEF has value zero if the respondent's PEF is in the fourth quartile of the distribution for males and females respectively; has values ranging from one to three if PEF is in the third, second, or first quartile respectively; and it also has value three if PEF could not be measured. The third biomarker is speed picking up a pen from the floor starting in a standing position (range 0 – 3). The variable associated with this biomarker has value zero if the speed is in the first quartile of the distribution, values ranging from one to three if it is in the second, third, or forth quartile respectively, and also value three if the speed could not be measured. The last biomarker is walking speed starting in a sitting position (range 0 -3). The variable associated with this biomarker has value zero if walking speed is in the first quartile of the walking speed distribution, values ranging from one to three if the walking speed is in the second, third, or fourth quartile respectively and value three if walking speed could not be measured.

**Sociodemographic Controls**. Age is included in the model as a continuous variable. Marital status is a dichotomous variable that considers an individual as being married if he or she reports to be married or in a consensual union (1 = yes, 0 = no). Socioeconomic status is controlled for by means of three indicators: educational attainment, income level, and housing conditions. All these measures have been shown to be related with the risk of death among the elderly (Feinglass et al., 2007; Zaho et al., 1993). In most Latin American countries, including Costa Rica, completed elementary school is the highest educational attainment older adults have reached. Therefore, education is a dichotomous variable indicating whether the respondent's educational attainment is at least at the level of completed elementary school (1 = yes, 0 = no). The income indicator is also dichotomous states whether the respondent's income is below the median of the income distribution (1 = yes, 0 = no). The housing condition indicator states whether the walls, roof, and floor of the respondent's house were as being in good, fair or poor conditions (1 = all in good conditions, 0 = any in fair or poor conditions). The last indicator states whether the place or residence is urban (1 = yes, 0 = no).

## Results

From the 2,523 respondents aged 60-89 in the original CRELES sample with complete survival status information, those with serious communication problems (32%) answered the interview with help of a proxy and were not asked the subjective survival question. Among those respondents that answered the subjective survival question some had incomplete information on the rest of the aforementioned measures (23%) and were also excluded from the analytical sample. The analytical sample is therefore composed of 1,318 individuals divided into two age groups: 60-69 and 70-89 years. The younger age group analytical sample includes 550 individuals (44% males). Mean age of respondents in the younger age group was 64.82 (SD 2.76) and 64.80 (SD 2.73) for males and females respectively. The older age group analytical sample includes 768 individuals (49% males). Mean age of respondents in this age group was 73.82 (SD 4.84) and 77.51 (SD 5.36) for males and females respectively. Among individuals in the younger age group 76 deaths  were registered in the period under observation (51% of them occurred among males); among individuals in the older age group the number of deaths registered during the same period was 119 (45% occurred among males). The great majority of respondents rated their health status as good or fair (See Table 1 for distribution of self-rated health and survival likelihood). Among respondents in the younger age group, the proportion of individuals responding that it was very likely they would survive to the target age was statistically significantly higher than the proportion answering it was very unlikely ($p < 0.001$).

However among individuals in the older age group, only for males the proportion of individuals answering it was very likely they would survive to the target age was statistically significantly (p = 0.056) higher than the proportion of individuals answering it was very unlikely, and this only marginally (See Tables 2 and 3 for the distribution of the sociodemographic and health-related variables respectively).

Table 4 shows the results of the survival analysis described in the Methods section for males in the younger age group. Subjective survival expectations were statistically significantly associated with mortality in Model 1 (HR 1.38, 95% CI [0.96,1.97], p = 0.079) and in Model 1+Biomarkers (HR 1.48, 95% CI [1.02,2.14], p = 0.039). These models do not include self-assessed health status as an independent variable. The upper part of Table 2 also shows that among males in the younger age group, self-rated health status was associated with mortality in Model 2 (HR 1.56, 95% CI [1.00,2.43], p = 0.048) and in Model 2+Biomarkers (HR 1.52, 95% CI [0.96,2.40], p = 0.074). These models do not include subjective survival expectations as an independent variable. The inclusion of biomarkers in Model 1 (Model 1+Biomarkers) resulted in a 7% increase in the mortality hazard associated with subjective survival compared to its value in the model without biomarkers. Including biomarkers in Model 2 (Model 2+Biomarkers) resulted in a 2% decrease in the mortality hazard associated with self-assessed health status. Therefore, among males in the younger age group, in models that may or not include biomarkers, include subjective survival expectations, and do not include self-assessed health status as independent variable, subjective survival expectations were significantly associated with mortality. In models that may or not include biomarkers, do not include subjective survival expectations, but include self-assessed health status, self-assessed health status was also significantly associated with mortality.

Among males in the younger age group, in the model that includes both subjective survival expectations and self-assessed health status and does not include biomarkers (Model 3), subjective survival expectations were not significantly related to mortality (HR 1.30, 95% CI [0.92, 1.84], p = 0.131); however, the association between self-assessed health status and mortality remained marginally significant (HR 1.47, 95% CI [0.96, 2.25], p = 0.074). Both hazard ratios, the one associated with self-reported survival expectations and the one associated with self-assessed health status, suffered a reduction of around 6% compared to their values in Models 1 and 2 respectively. Including biomarkers in the model (Model 3+Biomarkers) resulted in regained statistical significance (although marginal) and a 9% increase in the mortality hazard associated with subjective survival expectations (HR 1.42, 95% CI [1.00, 2.02], p = 0.052), compared to its value in the model without biomarkers (Model 3). The addition of biomarkers to the model also resulted in a 4% decrease in the hazard ratio associated with self-assessed health status and the loss of its marginal statistical significance (HR 1.43, 95% CI [0.93, 2.19], p = 0.102). Therefore, results suggest that, for males in the younger age group, subjective survival is an independent mortality predictor with and without the presence of self-assessed health status in a model including objective measures of health. These results also suggest that subjective survival expectations may not just be mediating the effects of self-assessed health status on mortality but instead may be mediating the effects of objective measures of health status on mortality.

Among males in the older age group, as among females in the younger age group, no association was found between subjective survival expectations or between self-rated health status and mortality in any of the six models. However, among females in the younger age group the coefficients associated with subjective survival expectations had the expected sign. On the contrary, the sign of the coefficients associated with self-rated health status were in the opposite direction. Among older females, subjective survival expectations were not related to mortality in any case (See Table 5). However, the worsening of self-assessed health status reduced their mortality risk by 30% at a 0.1 significance level in those models that do not include body functioning biomarkers, Model 2 (HR 0.68, 95% CI [0.44,1.04], p = 0.076) and Model 3 (HR 0.68, 95% CI [0.43,1.06], p = 0.091).

**Discussion**

Results of the current study show that only among males in the age group 60-69 did subjective survival expectations predict mortality independently of the inclusion of body functioning biomarkers in models adjusted for self-reported chronic conditions. Among these individuals, results also suggest that subjective survival expectations may be mediating the effects of objective measures of health status on mortality and not just mediating the effects of self-assessed health status on mortality. These results contrast with those obtained by van Doorn and Kasl (1998) and Siegel et al. (2003), who suggested that the estimation of future survival may be less meaningful among younger individuals than among older ones. Van Doorn and Kasl (1998) found that among males aged 70 and older subjective survival expectations were independent predictors of mortality. Siegel et al. (2003) also found that among males aged 70 and older, and among females as well, subjective survival probabilities were independent predictors of mortality. The present study did not find any association between subjective survival expectations or between self-rated health status and mortality in among individuals aged over 70. Little is known about the mortality predicting power of subjective survival expectations in developing countries. The different cultural background of the Costa Rican sample, as compared with the cultural backgrounds of individuals in the samples used by Van Doorn and Kasl and Siegel et al., may result in older individuals (for which, according to the mentioned authors death is more meaningful) to be less prone to forecast their own demise than the younger ones. Here may be operating somehow the same mechanisms Van Doorn and Kasl mentioned but the opposite direction: because these individuals are younger, death seems to be far away. Therefore quantifying its likelihood, in what appears to be a distant future, does not generate any type of distress.

In addition, results of the present study showed that self-assessed health status was associated with mortality also only among males in the younger age group. This result is in accordance with results obtained by Siegel et al. (2003) for HRS respondents. However, Siegel et al.'s study also found that self-rated health predicted mortality for both men and women in the AHEAD study. On the contrary, Van Doorn and Kasl (1998) found that among females aged 70 and older self-rated health status was not a predictor of mortality. Gender differences in the relationship between self-assessed health status and mortality are frequently reported in the literature (Benyamini, Leventhal, & Leventhal, 2000; Deeg & Kriegsman, 2003; Idler, Russell, & Davis, 2000; Sillén et al., 2005).

Among females in the older age group, self-assessed health status was a predictor of morality but not in the expected direction when neither subjective survival expectations nor the body functioning biomarkers were in the model. Similar results were obtained using a model that only adjusted for age and had self-assessed health status as independent variable: the worsening of self-assessed health status significantly decreased the mortality risk among older females in the analytical sample (HR 0.69, 95% CI [0.48, 0.98], $p = 0.038$) as well as in the whole older females sample (HR 0.80, 95% CI [0.62, 1.01], $p = 0.058$). It is possible that this result indicates that older women in Costa Rica are what van Doorn (1999) called health optimists. According to this author, health optimists are individuals who make use of different techniques to retain a positive view of their health in spite of having more than one important health problem. Such techniques include, for example, positively comparing themselves to others and minimizing health issues considering them a natural consequence of the process of aging. Importantly, results of the present study may indicate cultural differences that should be taken into account when comparing subjective measures of health status across countries as has already been suggested in the literature (Jürges, 2007; Jylhä et al., 1998; Menec, Shooshtari, & Lambert, 2007).

One of the limitations of this study is the reduced sample size that was further reduced by the loss of individuals in the analytical samples. The great majority of the losses were due to lack of information on subjective survival expectations. Overall, the set of individuals excluded from analysis is composed of older, less educated, and less healthy, individuals than those in the analytical samples. However, for both age groups the proportion of deaths that occurred among those in the analytical sample is not statistically significantly different from the proportion of deaths that occurred among those that not included in the analytical samples. To study the influence of missing data on the results, I used the method of imputations by chained equations

(STATA 11, ICE procedure) to impute the missing data. All variables were included in the model and five datasets were generated.

Using data drawn from the imputed aforementioned datasets, among males in the older age group the coefficient associated with subjective survival expectations did not qualitatively differ from the one obtained with the analytical sample for Model 1 (HR 1.32, 95% CI [0.96,1.81], p = 0.082) and Model 1+Biomarkers (HR 1.38, 95% CI [1.00,1.90], p = 0.053), as well as for Model 3 (HR 1.25, 95% CI [0.92,1.70], p = 0.152) and Model 3+Biomarkers (HR 1.32, 95% CI [0.97,1.81], p = 0.081). Results for self-rated health are also qualitatively similar for Model 2 (HR 1.53, 95% CI [1.02,2.30], p = 0.040) and Model 2+Biomarkers (HR 1.49, 95% CI [0.97,2.27], p = 0.065), as well as for Model 3 (HR 1.46, 95% CI [0.98,2.16], p = 0.063) and Model 3+Biomarkers (HR 1.41, 95% CI [0.94,2.10], p = 0.095). Among men in the older age group as well as among females in the younger one, in general results obtained using the imputed dataset were similar to those obtained when using the analytical samples. However, among females in the older age group, self-rated health that was statistically significantly related to mortality, although in the unexpected direction, in models that did not include body functioning biomarkers, that is to say in Model 2 (HR 0.80, 95% CI [0.58,1.10], p = 0.155) and Model 3 (HR 0.81, 95% CI [0.58,1.14], p = 0.223), lost it significance but not its sign.

Despite its limitations this study contributes to the literature related to subjective survival expectations in developing countries where this topic is not usually addressed. In developed countries, however, it has become increasingly common to associate subjective probabilities of surviving to certain ages, elicited from survey responses, with current health status, labor force participation, and investment and retirement decisions. Less studied is the contrast between expected and observed survival probabilities. Assessment of overall differences between underlying mortality risks and those perceived by individuals can be employed to establish the effect of external health shocks on updating self reported health status and conditions as well as potentially significant behavioral changes.

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Table 1

*Distribution of Self-Rated Health and Likelihood of Surviving to Target Age*

| | Age 60-69 | | Age 70-89 | |
|---|---|---|---|---|
| Variable | % Males | % Females | % Males | % Females |
| Self-Rated Health | | | | |
| Excellent | 12.70 | 5.48 | 8.57 | 6.67 |
| Very Good | 13.11 | 14.84 | 10.65 | 12.05 |
| Good | 33.61 | 35.16 | 34.81 | 33.59 |
| Fair | 36.48 | 38.71 | 38.96 | 40.00 |
| Poor | 4.10 | 5.81 | 7.01 | 7.69 |
| Likelihood of Surviving to Target Age | | | | |
| Very Likely | 58.61 | 41.29 | 37.14 | 31.79 |
| Likely | 14.75 | 14.52 | 14.55 | 20.51 |
| Unlikely | 11.48 | 15.81 | 17.66 | 18.46 |
| Very Unlikely | 15.16 | 28.39 | 30.65 | 29.23 |
| Totals (N = 1318) | 18.36 | 23.37 | 28.83 | 29.44 |

Table 2

*Sample Description Sociodemographic Variables*

| | Age 60-69 | | Age 70-89 | |
|---|---|---|---|---|
| Variable | % Males | % Females | % Males | % Females |
| More than Elem. School | 52.87 | 45.81 | 29.61 | 33.08 |
| Married or Cohabiting | 87.70 | 56.77 | 71.17 | 33.33 |
| Income over Median | 27.87 | 37.42 | 38.18 | 40.00 |
| House in Good Condition | 48.77 | 48.39 | 49.61 | 46.41 |
| Urban Residence | 56.15 | 63.87 | 57.14 | 70.26 |
| Totals (N = 1318) | 18.36 | 23.37 | 28.83 | 29.44 |

Table 3

*Sample Description Health-Related Variables*

| | Age 60-69 | | Age 70-89 | |
|---|---|---|---|---|
| Variable | % Males | % Females | % Males | % Females |
| No Chronic Conditions | 33.20 | 15.48 | 26.75 | 15.17 |
| Overnight Hospital Stays | 9.43 | 4.19 | 10.39 | 8.46 |
| Unintentional Weight Loss | 9.02 | 7.74 | 9.87 | 10.26 |
| No PFs | 54.92 | 44.52 | 49.61 | 28.79 |
| No IADLs | 94.67 | 91.94 | 89.35 | 79.18 |
| Depression | | | | |
| No Symptoms | 81.56 | 70.97 | 81.04 | 75.38 |
| Mild | 14.34 | 20.97 | 14.03 | 18.46 |
| Moderate/Severe | 4.10 | 8.06 | 4.94 | 6.15 |
| Current Smoker | 18.44 | 3.87 | 11.17 | 2.56 |
| Current Drinker | 47.95 | 25.16 | 41.56 | 20.51 |
| BMI | | | | |
| Underweight | 1.23 | 0.97 | 1.56 | 3.08 |
| Normal | 27.87 | 24.52 | 46.49 | 33.93 |
| Overweight | 48.77 | 42.90 | 39.74 | 35.99 |
| Obese | 22.13 | 31.61 | 12.21 | 26.99 |
| Totals (N = 1318) | 18.36 | 23.37 | 28.83 | 29.44 |

Table 4

*Risk of Death – Estimated Hazard Rates – Males Aged 60-69 at Baseline*

| Models Not Including Physical Functioning Biomarkers | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| | HR | SE | HR | SE | HR | SE |
| Self-Assessed Survival | 1.38† | 0.25 | | | 1.30 | 0.23 |
| Self-Assessed Health | | | 1.56* | 0.35 | 1.47† | 0.32 |
| | | | | | | |
| **Models Including Physical Functioning Biomarkers** | **Model 1+ Bio** | | **Model 2 + Bio** | | **Model 3 + Bio** | |
| | HR | SE | HR | SE | HR | SE |
| Self-Assessed Survival | 1.48* | 0.28 | | | 1.42† | 0.26 |
| Self-Assessed Health | | | 1.52† | 0.36 | 1.43 | 0.31 |

*Note*: Regressions adjusted by age, gender, education, marital status, income, condition of the house, urban residence, index of chronic conditions, BMI, BMI squared, PF, IADL, depression, hospital stays, currently smoking, currently drinking alcoholic beverages.

†: p-value < 0.1; *: p-value < 0.05; **: p-value < 0.01; ***: p-value < 0.001

Table 5

*Risk of Death – Estimated Hazard Rates – Females Aged 70-89 at Baseline*

| Models Not Including Physical Functioning Biomarkers | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| | HR | SE | HR | SE | HR | SE |
| Self-Assessed Survival | 0.91 | 0.12 | | | 0.98 | 0.13 |
| Self- Assessed Health | | | 0.68† | 0.15 | 0.68† | 0.16 |
| | | | | | | |
| **Models Including Physical Functioning Biomarkers** | **Model 1+ Bio** | | **Model 2 + Bio** | | **Model 3 + Bio** | |
| | HR | SE | HR | SE | SE | HR |
| Self- Assessed Survival | 0.91 | 0.11 | | | 0.97 | 0.12 |
| Self- Assessed Survival | | | 0.69 | 0.16 | 0.70 | 0.17 |

*Note*: Regressions adjusted by age, gender, education, marital status, income, condition of the house, urban residence, index of chronic conditions, BMI, BMI squared, PF, IADL, depression, hospital stays, currently smoking, currently drinking alcoholic beverages

†: p-value < 0.1; *: p-value < 0.05; **: p-value < 0.01; ***: p-value < 0.001

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