

UCSF

UC San Francisco Previously Published Works

Title

Subjective socioeconomic status and health: Relationships reconsidered

Permalink

<https://escholarship.org/uc/item/6087g4cc>

Authors

Nobles, Jenna
Weintraub, Miranda Ritterman
Adler, Nancy E

Publication Date

2013-04-01

DOI

10.1016/j.socscimed.2013.01.021

Peer reviewed



Published in final edited form as:

Soc Sci Med. 2013 April ; 82: 58–66. doi:10.1016/j.socscimed.2013.01.021.

SUBJECTIVE SOCIOECONOMIC STATUS AND HEALTH: RELATIONSHIPS RECONSIDERED

Jenna Nobles*,

Sociology, University of Wisconsin, Madison

Miranda Ritterman Weintraub, and

School of Public Health, University of California, Berkeley, USA

Nancy Adler

Health Psychology, Center for Health and Society, University of California, San Francisco

Abstract

Subjective status, an individual's perception of her socioeconomic standing, is a robust predictor of physical health in many societies. To date, competing interpretations of this correlation remain unresolved. Using longitudinal data on 8,430 older adults from the 2000 and 2007 waves of the Indonesia Family Life Survey, we test these oft-cited links. As in other settings, perceived status is a robust predictor of self-rated health, and also of physical functioning and nurse-assessed general health. These relationships persist in the presence of controls for unobserved traits, such as difficult-to-measure aspects of family background and persistent aspects of personality. However, we find evidence that these links likely represent bi-directional effects. Declines in health that accompany aging are robust predictors of declines in perceived socioeconomic status, net of observed changes to the economic profile of respondents. The results thus underscore the social value afforded good health status.

Socioeconomic disparities in morbidity remain one of the most universal patterns of inequality (Link and Phelan 1996, Marmot 2004). The material links arising from education, income, and wealth that underlie these disparities are well-established (Kawachi, Adler, and Dow 2010; Smith 2004; Strauss and Thomas 2008). Increasingly, scholarship emphasizes the socio-psychological origins of health inequality, demonstrating that the value of socioeconomic resources lies, in part, in how these resources are perceived (Schnittker and McLeod 2005; Singh-Manoux, Marmot, and Adler 2005). Through the process of comparison inherent to social interaction, individuals internalize perceptions of their place in socioeconomic hierarchies. These perceptions, in turn, may influence health through various mechanisms, including stress-related neuroendocrine pathways (McEwen and Gianaros 2010). That is, the stress of internalized inferiority has meaningful, negative physiological

© 2013 Elsevier Ltd. All rights reserved.

*4406 Sewell Social Sciences, 1180 Observatory Drive, Madison, WI, 53706 (jnobles@ssc.wisc.edu).

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

effects and these effects exist above and beyond the consequences of material deprivation (Marmot 2004).

The logic has been widely embraced by a rapidly growing literature in health sciences that documents a robust correlation between individual perceptions of socioeconomic status – that is, “subjective” status – and health. Numerous studies link measures of subjective socioeconomic status to a myriad of health indicators in populations around the globe (e.g., Adler et al. 2000; Demakakos et al. 2008; Friestad and Klepp 2006; Goodman et al. 2001; Lemeshow et al. 2008; Hamad et al. 2008). Most often, the correlation between subjective socioeconomic status and health persists after adjustment for “objective” socioeconomic indicators – such as education, income, and wealth – giving weight to a causal interpretation of this association. The interpretation is consistent with the work linking population-level income inequality and population health – a relationship receiving considerable press in recent years (Adelman 2007; Wilkinson and Pickett 2009).

Active debate continues about material versus socio-psychological interpretations of the adjusted correlation between subjective socioeconomic status and health, with some arguing that other pathways may also explain the link. Alternative explanations reference difficult-to-measure characteristics of families and individuals, such as educational quality and asset networks that may be captured more fully in subjective assessments. Other alternatives include reverse causation, running from health to perceived status, and personality-based response bias that may drive both perceptions of status and health outcomes (Bago d’Uva et al. 2008; Garbarski 2010; Singh-Manoux, Marmot, and Adler 2005). Schnittker and McLeod summarized this perspective, writing: “researchers cannot fully understand the mechanisms behind these effects without adequately understanding from where individuals derive their senses of status” (2005:84).

The present study takes up this issue. In doing so, we seek to refine the interpretation of the now widely-cited subjective socioeconomic status-health relationship. We develop tests that explicitly consider the role of perceptions and other unmeasured individual-specific characteristics in the production of subjective status assignment; we look for a correlation between subjective socioeconomic status and health that persists when adjustments for these concerns are made. We then assess whether a remaining correlation necessarily implies a causal relationship between subjective status and health. We consider an alternative hypothesis: health is one of the characteristics over which individuals cognitively average when assessing their position within socioeconomic hierarchies.

Our analysis relies upon longitudinal, population-representative data on older adults from the 2000 and 2007 waves of the Indonesia Family Life Survey. The novel data include prospective subjective socioeconomic status assessments by respondents as well as prospective health information measured by trained health workers.

Our analysis is not designed to *rule out* a causal role of subjective status in health trajectories, but instead to evaluate the extent to which the association between these variables may also be attributed to the causal impact of health on subjective socioeconomic status. The endeavor extends existing research in other ways as well. Methodologically, we

suggest specific tests of frequently suggested alternative explanations for the subjective status-health relationship. These methods, which rely on longitudinal data, emphasize a point largely overlooked in health sciences literature: subjective status, like “objective status,” is unlikely fixed across the life course. Finally, by considering a reverse causal link between subjective socioeconomic status and health, we underscore the role of health as an important building block of social organization.

SUBJECTIVE SOCIOECONOMIC STATUS AND HEALTH

The study of perceived socioeconomic standing has a long history. In 1909, C.H. Cooley famously argued that socioeconomic hierarchies are not monolithic but instead vary according to one’s vantage point (285). Stratification scholars have subsequently examined the multidimensionality of class standings in-depth, with particular focus on that variation which originates in individual perceptions (Jackman and Jackman 1973; Kluegel, Singleton, and Starnes 1977). To examine this variation, U.S. surveys in the 1960s and 70s asked individuals to describe their socioeconomic standing by choosing from a set of named social classes (e.g., Kluegel et al. 1977). More recently, the practice was adopted by development organizations asking respondents to rank themselves on a “ladder” (sometimes described as a Cantril (1965) ladder), providing subjective interpretations of poverty in a systematic way across populations (Ravallion and Lokshin 2001).

A similar ladder-based survey tool was designed by Adler and colleagues (2000) and introduced into the health sciences literature in the United States in the late 1990s. The instrument was designed to avoid value-laden labels and a tendency of people to define themselves as “middle class” by asking individuals to consider their relative status on several domains of socioeconomic status and assess their overall position. The measure offered a useful tool for scientists interested in how social interaction and social hierarchy produce health disparities in human populations. Importantly, the approach provided a meso-level anchor for the documented macro-level effects of income inequality on population health (Wilkinson 1996; Schnittker and MacLeod 2005).

Subsequently, a rapidly growing literature has documented a robust association between perceived socioeconomic status and biological indicators of health status – including heart rate, sleep latency, cortisol habituation to stress, body fat distribution (Adler et al. 2000), angina, glycated hemoglobin (Demakakos et al 2008), neuro-physiological reactivity (Gianaros et al. 2001), as well as self-reported outcomes, such as depression (Demakakos et al. 2008), perceived stress (Hamad et al. 2008), physical functional status (Hu et al. 2005), long-standing illness (Demakakos et al. 2008), oral health (Sanders et al. 2006), and self-rated health (Adler et al. 2000; Operario, Adler, and Williams 2004; Demakakos et al. 2008; Cundiff 2011). Correlations between subjective socioeconomic status and measures of health, though varying in magnitude, appear to extend across many sub-populations in the US (Lemeshow et al. 2008; Subramanyam et al. 2012; Wolff et al. 2010), and across several international populations, including Norway (Friestad and Klepp 2006), Hungary (Kopp et al. 2004), South Africa (Hamad et al. 2008), Taiwan (Hu et al. 2005), and Mexico (Fernald and Adler 2007; Ritterman et al. 2009).

What explains these correlations? By design, subjective ratings reflect socioeconomic resources that strongly predict health outcomes. Not surprisingly, most studies demonstrate that when indicators of education, assets, and income are introduced into regression analyses, the correlation between subjective socioeconomic status and health diminishes in size. However, these economic covariates rarely explain the entirety (or even the majority) of the subjective status-health link (e.g., Adler et al. 2000; Hu et al. 2005).

The remaining correlation has a number of possible interpretations. The most emphasized interpretation is that the correlation is causal. The added association of subjective status and health is hypothesized to reflect the health damage inflicted by emotional and cognitive responses of individuals who assign themselves a lower socioeconomic position. This suggests that the experience of low status itself has negative physiological consequences (Marmot 2004; Wilkinson and Pickett 2009), which operate through stress-related neuroendocrine pathways (McEwen and Gianaros 2010; Singh-Manoux et al. 2005).

An artifactual explanation of the association views it as spurious, resulting from the joint association of an underlying factor with both subjective status and health. For example, mental health and negative affect are likely predictors of both subjective socioeconomic status and physical health outcomes, particularly those that are self-reported and represent *perceptions* of health versus biological indicators of functioning (Bago d'Uva et al. 2008; Gabarski 2010; Powadthee, 2007). Nevertheless, several studies have shown that the correlation between subjective socioeconomic status and reported health, if lessened in magnitude, persists in the presence of depression and affect controls (e.g. Lemeshow et al. 2008; Operario et al. 2004).

Other underlying factors may include aspects of economic standing that are poorly measured by the standard set of socioeconomic controls. That is, the additional explanatory power of subjective socioeconomic status may derive from the measure's ability to capture characteristics like the *quality* of schooling received or wealth among the extended family (Braveman et al. 2005; Schnittker and MacLeod 2005).

Empirical tests of these alternative interpretations have proved difficult to implement. Most studies only measure subjective status at a single point in time. Few have the economic detail and the mental and physical health measures necessary to consider the aforementioned hypotheses. Others are limited by small samples (Chen and Patterson 2006), of which few are population-representative (Reitzel et al. 2007).

In the current study, we relate subjective socioeconomic status to health indicators with a method that explicitly accounts for differences in perceptions and unmeasured socioeconomic characteristics. We then posit an alternative explanation for a remaining correlation between subjective socioeconomic status and health: reverse causality. The argument has been suggested in passing (e.g., Singh-Manoux et al. 2005) but with one exception (Gabarski 2010), has yet to receive any real consideration. Namely, the above explanations overlook the idea that individuals incorporate their health status into internalized perceptions of their place in social hierarchies. We hypothesize that, among other things, health causes subjective socioeconomic status. Gabarski's (2010) study of older

adults in Wisconsin makes a similar case but is limited to a single period measure of subjective socioeconomic status, complicating the production of evidence for bi-directional relationships.

The logic underlying our hypothesis is actually widely embraced; the influence of health on socioeconomic standing is well-established. Numerous studies document the education and wage penalties of poor health (e.g., Alderman, Hoddinott, and Kinsey 2006; Baldwin, Zeager, and Flacco 1994; Baum and Ford, 2004; Haveman and Wolfe 2000; Jackson 2009; Thomas et al. 2004). The social stigma that accompanies the presence of disability and health declines at older ages is well-known (e.g., Albrecht, Walker, and Levy 1982; Susman 1994). We move this logic further by arguing that health also influences how individuals value *themselves* in the context of socioeconomic hierarchies.

This logic should hold in any setting where good health warrants a wage and status premium and where these premiums are known. However, the value of health for social and economic resources may be particularly relevant in low-income settings, where economies are based on agriculture and the ability to accrue income is often dependent on physical health (Ravallion and Lokshin 2001; Thomas et al. 2004). We thus test our argument using data from Indonesia.

HEALTH AND AGING IN INDONESIA

The Indonesian population, now over 230 million persons, has witnessed dramatic change over the past four decades. Sustained economic growth was accompanied by marked declines in fertility, increases in education, and expansions in health care. Over this period, the total fertility rate fell from 6 to 2.4 and the average level of adult education increased from 2 to 7 years (Gubhaju 2008; Leeuwen 2007:66). By 1997, more than half of the adult population had local access to public health care (Barber et al. 2007) and by 2005, over four-fifths of the population had access to clean drinking water (World Health Organization 2008).

Unsurprisingly, these gains extend to the population's health and aging profile. In 1965 life expectancy was 43 years for men and 45 for women; by 2008 it had increased to 68 and 72 years for men and women, respectively (World Bank 2010). In 1961, 4.5% of the population was above the age of 60; this figure increased to 9% by 2007 and should reach 14% by 2025 (Gubhaju 2008; Nitisastro 1970:203). The population's health profile shares many patterns with countries around the world. Inequality in health conditions follow class lines; an expenditure and education gradient exists for numerous outcomes, including self-rated health and ADL indicators of functioning (Bago d'Uva et al. 2008; Stoddard 2006). As in other populations, self-rated health predicts later-life morbidity and mortality (Frankenberg and Jones 2004).

Subjective status has yet to receive much attention in studies of the Indonesian population. Nevertheless Powdthavee (2007) indicates that the ladder measure appropriately captures welfare in Indonesia and is highly correlated with expenditures and education. Further, individual perceptions of social standing in Indonesia correspond to realized expenditure and income rankings *within* communities (Powdthavee 2009). Powdthavee (2007) also identifies

a component of subjective status not attributable to economic measures. This residual is partially explained by demographic characteristics, such as gender, age, and household size, as well as unobserved individual characteristics, described as “personality traits” and “mood effects” (Powdthavee 2007: 189).

Our task, then, is to consider how much of this individual variation can be ascribed to measures of health, while appropriately considering the competing role of economic indicators, demographic indicators, and potential bias introduced by personality and perceptions.

METHOD

Data and Measurement

Data come from the Indonesia Family Life Survey (IFLS), a longitudinal household survey with a sample representative of 83% of the Indonesian population. The survey was first fielded in 1993 and collected data from members of over 7,400 households. Follow-up waves were fielded in 1997, 2000, and 2007. Response follow-up rates were high: nearly 95% in the second and third wave and 91% in the fourth wave (Frankenberg and Thomas 2000, Strauss et al. 2009). The IFLS includes rich social, economic, and health information. In 2000, a module was introduced asking all adult respondents to report subjective socioeconomic status information; the module was repeated in 2007. Our analysis uses data from these two waves.

Our sample comprises adults age 35 and older in 2000 who were measured again in 2007, providing 8,430 individuals to be studied. The sample is 46% male. Nineteen percent have no formal education; 29% have some primary, 24% have completed primary, and 28% have at least some secondary education. In 2000, sample respondents had a mean age of 48.5 years (S.D.=10.5); 45% lived in an urban area.

Subjective Status

The IFLS subjective socioeconomic status indicator asks about status in terms of resources. In 2000 and 2007, all adults were asked to place themselves somewhere on a 6-rung ladder “where 1 represents the poorest people and 6 represents the richest people.” The average value reported was 2.88 in 2000 and 2.81 in 2007.

Health

We selected indicators of health with the goal of including those indicators common to the large literature on perceived socioeconomic status and health. Two indicators are reported by respondents: self-rated health (ranging from 1= “very unhealthy” to 4=“very healthy”) and the ability and ease of completing activities of daily living—an ADL score. Respondents are asked about the ease of engaging in ten activities that include self-maintenance (bathing, dressing, eating) and physical functioning (standing from a sitting position, walking 5 kilometers). We assign a value to each item response (“unable to do it”=0; “with difficulty”=1; “easily”=2) and sum these values to generate a 20-point scale ($\alpha=0.76$ in 2000, $\alpha=0.83$ in 2007). The third health measure is assessed by trained health

workers. Nurses collect anthropometric data and assess respondents' overall health relative to others of the same age and sex on a 9-point index. Importantly, this assessment takes place separately from the rest of the interview. Respondents are not informed of nurse assessments and nurses are not made aware of the respondent-reported health information collected earlier by the interview team.

The health measures were collected in both 2000 and in 2007 and are coded such that higher values represent better health. The indicators are positively correlated with each other (coefficients range from 0.03 to 0.35, $p < 0.05$). Most importantly, each indicator in 2000 is significantly and inversely correlated with respondent mortality by 2007 (results available from authors).

Controls

We control for respondents' age (in years), gender, and region of residence (urban vs. rural). To appropriately measure socioeconomic indicators as a counterpoint to the ladder, we control for education, using dichotomous indicators of no schooling, some primary, completed primary, and some secondary or greater. We measure an index of household asset ownership and per capita monthly household expenditures (expenditures are preferred to income in agricultural settings where income fluctuates seasonally). Descriptive statistics for assets and expenditures, which are time-varying, are shown in Table 1. Mental health is measured using the short-form (30-point continuous scale) of the Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff 1977), introduced to the IFLS in 2007.

Approach

We begin the analysis with cross-sectional OLS regressions (equation 1) of health measures (δ) on subjective socioeconomic status (φ) in which i indexes individuals and β are estimated coefficients. All characteristics are measured in 2007.¹ The regressions assume a linear relationship between the health measures and covariates; more flexible alternative specifications produce similar results (available from authors). In the first specification, we control for age, sex, household size and region of residence (π). We then introduce controls for "objective" measures of socioeconomic status (κ): education (in years), assets (index), and household expenditures. We finally introduce respondents' scores on the CES-D (ω).

$$\delta_i^{2007} = \alpha + \beta_1 \varphi_i^{2007} + \sum_x \beta_x \pi_i^{2007} + \sum_y \beta_y \kappa_i^{2007} + \beta_z \omega_i^{2007} + \varepsilon_i \quad 1$$

By replicating existing research, this set of cross-sectional regressions allows us to assess whether the correlation between subjective socioeconomic status and health is observable in the low-income Indonesian population. The results also provide a starting point against which the subsequent analysis can be compared – i.e., what patterns are missed by limiting our analysis to cross-sectional data?

¹Identical specifications using data from 2000 available in online material.

The remainder of the analysis informs the interpretation of the adjusted association between subjective socioeconomic status and health (β_1 in eq. 1) - commonly observed in existing studies from specifications akin to equation 1.

Omitted variable bias

To test the hypothesis that the relationship between subjective socioeconomic status and health represents (a) difficult-to-measures aspects of objective economic status or (b) personality and reporting bias, we pool two waves of data from 2000 and 2007 on individuals and specify a set of individual fixed-effect regressions (equation 2), where i indexes individuals, t indexes time, ϕ represents subjective socioeconomic status, δ are the health measures λ , are time-varying controls, η is a dichotomous indicator of the survey wave, μ are the individual fixed effects, and β are estimated coefficients. Time-varying controls include expenditures, assets, and household size; education does not vary over time for this age group and the CES-D was not measured in 2000.

$$\delta_{it} = \alpha + \beta_1 \phi_{it} + \sum_x \beta_x \lambda_{it} + \beta_3 \eta_t + \mu_i + \varepsilon_{it} \quad 2$$

The fixed effects—conceptually equivalent to including a dummy variable for each individual in the analysis—adjust for any individual-level characteristic that is time-invariant, whether or not it is observed (see Allison 2009, Bollen and Brand 2010). The approach has been used extensively to model the relationship between objective socioeconomic status and health (e.g., Desai and Alva 1998; Gunasekara, Carter, and Blakely 2011; Haas 2006) because potential confounders, like parental socioeconomic status, birth conditions, and fixed environmental conditions can be held constant. In the present analysis, the inclusion of fixed effects explicitly tests others’ concerns that the relationship between perceived socioeconomic status and health simply represents some combination of unmeasured education quality, extended family wealth, or personality bias.

Reverse causality

Finally, we test for patterns in the data consistent with a bi-directional relationship between subjective socioeconomic status and health. To motivate this assessment, we reverse the independent and dependent variables in the fixed-effects estimations (equation 3). These tests look for within-person changes in perceived status that accompany changes in health.

$$\phi_{it} = \alpha + \beta_1 \delta_{it} + \sum_x \beta_x \lambda_{it} + \beta_3 \eta_t + \mu_i + \varepsilon_{it} \quad 3$$

Importantly, we may expect the health-perceived status association (β_1) to be asymmetric; that is, perceived social standing may be more heavily influenced by health *declines* than by health improvements as people age. As such, we first estimate Eq. 3 for all respondents and then exclude those who exhibited health improvements on these indicators between 2000 and 2007.

With evidence in hand that the correlation between subjective socioeconomic status and health may reflect processes operating in both directions, we test this hypothesis by specifying a cross-lagged panel model with structural equation modeling software. The model was initially developed by Campbell (1963) and has been used extensively in subsequent years in psychology, education, sociology, and health sciences (e.g., Fincham, Harold, and Gano-Phillips 2000, Kivimaki et al. 2000, Little et al. 2007).

We simultaneously regress health measured in 2007 on subjective socioeconomic status in 2000 and subjective socioeconomic status measured in 2007 on health measured in 2000. Lagged versions of the outcome variables are controlled (these are measured in 2000), as are demographic characteristics and socioeconomic characteristics (π and κ in eq. 1-3) measured in 2000. The approach has the added value of explicitly establishing temporal order between the proposed causes and outcomes.

The cross-lagged model also facilitates the specification of health status as a latent construct – unobserved but indicated with multiple measured constructs in combination (Kline 2005). We use the three health indicators to capture latent indicators of general health status in 2000 and in 2007 (measurement model details are available from authors). We use a maximum likelihood estimator robust to non-normal variable distributions.

Like the research positing a relationship from subjective status to health, our analysis assumes conditional ignorability; that is, we must believe that all consequential confounders are measured and used to balance the comparisons. Arguably, the design of the analysis in the present study takes further steps to generate appropriate comparisons than do existing studies positing a unidirectional relationship; the methods here create balance on a number of observed covariates (including lagged measures of the outcome variables) and, in the case of the fixed-effects estimates, on enduring *unobserved* covariates.

An additional measurement issue warrants note: all three of these oft-used health outcomes include variation in respondent and nurse *perceptions* of good health. In 2007, anchoring health vignettes were introduced to a 10% subsample of the IFLS. These take a similar format to those in the Health and Retirement Study in the U.S.; the interviewer describes the characteristics of a hypothetical person and asks the respondent to rate the person's health on a five-point scale. We re-estimated equation 1 for this subsample and introduced responses to the vignettes as controls. The estimated coefficients shifted by a few thousandths, reducing our concern that the findings here simply represent correlated measurement error (results available from authors). Importantly, the individual fixed-effect also provides some protection against this threat by sweeping out any enduring person-specific variation in perceptions of what constitutes good health.

The IFLS sampling design samples households from within communities. Standard errors for equation 1 and the cross-lagged panel model are appropriately adjusted for clustering at the largest level - here, the community - with a sandwich estimator (Wooldridge 2003). In equations 2-3 the fixed effect addresses this issue. We use Stata 11 to estimate equations 1-3 and Mplus 6.1 to estimate the cross-lagged panel model.

RESULTS

Descriptive analysis indicates that subjective socioeconomic status varies substantially as individuals age. More than half of the sample reports a different standing on the ladder in 2007 than in 2000 (Table 1). Although the measure is often treated as a static concept, the correlation of the measures over time is only 0.29. We demonstrate below that the temporal variation in subjective socioeconomic status is highly correlated with temporal changes in “objective” socioeconomic status, suggesting that respondents’ self-assessment of social standing is responsive to changes in their economic profiles. The temporal correlations in the health measures are modest in magnitude, indicating considerable population variation in health trajectories with age.

Subjective Socioeconomic status and Health: Does the Relationship Extend to Indonesia?

Table 2 presents results from three sets of cross-sectional regressions in which subjective socioeconomic status is used to predict three different health outcomes. The first set of regressions (Panel A) includes basic demographic controls. The second and third add socioeconomic controls (Panel B) and mental health (Panel C) incrementally. The fourth set of regressions (Panel D) pools the 2000 and 2007 data and includes an individual-level fixed effect.

We observe a persistent correlation between subjective socioeconomic status and health that extends across multiple indicators. In the first set of specifications, individuals who place themselves higher on the ladder report greater ease of accomplishing daily activities and better overall health than do those who rank themselves lower on the ladder, holding constant demographic characteristics. These individuals also have better overall health according to independent nurse evaluations.

As expected, the inclusion of economic indicators significantly attenuates the size of the coefficient on subjective socioeconomic status (Panel B, Table 2). Nevertheless subjective socioeconomic status remains a significant predictor of each of the health indicators. The third set of specifications introduces an indicator of depression (Table 2, Panel C). The coefficients on the *reported* health indicators attenuate substantially. Subjective status is no longer a significant predictor of the activities of daily living score. The coefficient predicting self-rated health, while still significant, is about two-thirds the size. The coefficient predicting nurse-rated health attenuates in magnitude but only marginally. Notably, the depression scale is a significant predictor of each of the outcomes.

We then introduce a second wave of data and an individual-level fixed effect to these estimations. The estimates (Table 2, Panel D) can be interpreted as the change in health status associated with a one-point change in the ladder ranking between the two surveys. The fixed effects in these equations control for all respondent characteristics that are time-invariant. These unmeasured persisting characteristics do not appear to explain the entire relationship between subjective socioeconomic status and health. The estimate on self-rated health declines by about half but remains precisely estimated. By contrast, the estimate on nurse-rated health increases by roughly a third.

The relationship between subjective socioeconomic status and health in Indonesia is thus similar to that found in the much wealthier populations that dominate research on the subject (Adler, and Williams 2004, Demakkakos et al. 2008) and persists in the presence of controls for the most oft-mentioned omitted measures.

A key alternative explanation remains untested by this analysis, however, since the fixed effects approach simply tests for contemporaneous within-person change in health and subjective socioeconomic status. It is still possible that it is not only that subjective status affects health, but that subjective status is itself determined by health.

The Origins of the Correlation: Bi-Directional Relationship?

Table 3 contains estimates from a second set of fixed effect regressions. When we reverse health and subjective socioeconomic status in equation 2, we observe statistically meaningful correlations that appear to be operating in the opposite direction. The effect of self-rated health on subjective socioeconomic status is 0.032 and significant at 5%; the effect of nurse-rated health on subjective status is 0.050 and is significant at 1%. When we focus the comparison on the temporal changes observed for persons whose health *declines* (Table 2, Panel B), we observe correlations that are even larger and extend across all three health outcomes.

We thus used the prospective data to estimate a latent variable, cross-lagged panel model to look for a bi-directional relationship between health and subjective socioeconomic status (Figure 1). Goodness of fit statistics (RMSEA, CFI) suggest a reasonably good fit. The root mean squared error of approximation is 0.05 - values of 0.05 and less are considered a good fit - and the comparative fit index is 0.71 - values of 0.90 and greater are considered indicative of good fit, with fit diminishing as the CFI declines to zero (Kline 2005).

Selected coefficients from this specification, both standardized and unstandardized, are presented in Figure 1. Net of objective and subjective socioeconomic status in 2000, the latent health status indicator is predictive of subjective socioeconomic status in 2007. Though less precisely estimated and outside of statistical significance, we also observe a positive correlation between subjective socioeconomic status in 2000 and health in 2007, net of health and other covariates measured in 2000. Standardized estimates indicate that the cross-lagged parameter linking health status (2000) to subjective status (2007) is larger than the cross-lagged parameter estimated on subjective status (2000) when predicting health status (2007). However, this difference in magnitude is not statistically meaningful and may arise in part because the autocorrelations differ between the two outcomes; health is more stable over time than subjective status, leaving less variation to be explained.

Other Considerations: Selective Attrition and Selective Mortality

Longitudinal studies of older individuals are always subject to potential mortality and attrition bias. In our study, 10% of individuals with information in 2000 had died by 2007. An additional 19% could not be used in the analysis because of attrition or incomplete information in 2007. If respondents with lower subjective socioeconomic status in 2000 have worse health and are more likely to die or attrite by 2007, we have an analytical sample

that is truncated on our outcomes of interest. We assessed selection bias by using the 2000 data to separately estimate equation 1 (Panel A of Table 2) for three groups: those who we observe in 2007 (our analytical sample), those who die by 2007, and those who attrite or have incomplete data in 2007. For each health outcome, we observe regression coefficients that are positive, significant, and relatively close in magnitude across the three groups (table available from authors). For example, the coefficient estimated for subjective socioeconomic status measured in 2000 when used to predict the 2000 measure of nurse-rated health is 0.071 (standard error (*s.e.*)=0.020) for the analytical sample, 0.087 (*s.e.*=0.038) for those who subsequently die, and 0.098 (*s.e.*=0.027) for those who subsequently attrite. This suggests that, if anything, our sample may *underestimate* the relationship between subjective socioeconomic status and health because of nonrandom mortality and attrition.

DISCUSSION

A rapidly expanding body of research in health sciences describes the importance of social comparison in the production of health. In this paper, we consider the debated mechanisms underlying this assertion with data that support a more rigorous set of analyses than has previously been feasible. In so doing, we emphasize an argument largely overlooked to-date: the role of health in the production of social comparison.

Our analysis demonstrates a correlation between subjective socioeconomic status and health that persists when controls are introduced for objective measures of socioeconomic status, depression, perceptions, and all unmeasured time-invariant spurious factors, such as difficult-to-measure characteristics of the individuals' socioeconomic status and fixed components of individual-level response bias. We present evidence that the correlation between subjective socioeconomic status and health may well arise from effects operating in both directions— similar in nature to the relationship between objective status and health (Smith 2004).

The evidence presented here is not unassailable with respect to causal interpretation. In combination, the methods rule out many of the alternative hypotheses suggested by previous research. Nevertheless, something that is not held constant in either the fixed effect or cross-lagged panel regressions and that drives both changes in health outcomes and changes in subjective status, such as a *changing* aspect of objective socioeconomic status (other than those measured) or *changing* levels of depression (which is limited to a time-invariant measure in this analysis), could explain these results. Thus, the theory and evidence developed here are consistent with a causal path from health to subjective status but are still subject to the interpretation caveats that accompany observational research.

If health is indeed a cause of subjective socioeconomic status, several implications emerge. First, studies using cross-sectional data must take caution in interpreting the correlations between subjective socioeconomic status and health as “effects.” Second, a test demonstrating the *causal* path from subjective status to health would be valuable. Such a test may at first seem elusive; however, many quasi-experimental designs are possible. For example, in the case of Indonesia, status hierarchies were likely affected during the 1998 economic collapse when the price of rice skyrocketed and rural rice producers fared well

relative to others in a highly visible way (Levinsohn, Berry, and Friedman 2003). How this event or other examples of externally-driven social reorganization affect health outside of their income effects could be examined.

Notably, our study does not address two relevant debates about subjective socioeconomic status. The analysis does not consider heterogeneity by ethnicity, gender, and age; exploration of these issues is merited but beyond the scope of the present study. Further, our results do not resolve the debate concerning the relative importance of subjective and objective socioeconomic status in the production of health inequalities. While we have focused on the magnitude of the effects of subjective status on health, the same issues arise in relation to objective SES measures. Because the majority of the research combining objective and subjective measures is cross-sectional (Singh-Manoux, Adler, and Marmot 2003; Hu et al. 2005), or longitudinal but with one measure of subjective status (e.g, Macleod et al. 2005; Singh-Manoux, Marmot, and Adler 2005), the effects of objective socioeconomic status on health are also likely upwardly biased (Kawachi, Adler and Dow 2010; Smith 2004; Strauss and Thomas 2008).

A byproduct of our investigation is verification of the major relationships between subjective socioeconomic status and health in a developing country setting. The extent to which our argument extends to other settings remains a question for future research. The underlying logic - that poor health has wage and status penalties and that these are implicitly or explicitly known to population members - is not limited to the population of Indonesia or other developing countries. It remains possible, however, that the value placed on health and the socioeconomic effects of deteriorating health status are not equivalent across settings. In agricultural contexts, health may be a larger part of the cognitive averaging process used to assess one's position in society than it is in more industrial societies. Certainly it will be important for future research to consider the role of reverse causation in resource-rich populations.

Despite these limitations, our findings underscore an argument that is increasingly embraced by academics and policymakers: health serves as a critical component in the production of social organization. In recent years, scholars have emphasized the role of health in the creation of social inequality and its maintenance across generations (Jackson 2009; Smith 2004; Strauss and Thomas 2008). Here we argue that health also plays a role in the creation of internalized perceptions of status. Comparative positioning in the socioeconomic hierarchy is thus not only shaped by wealth, expenditures, and education, but also by the capital that accompanies strength, functioning, and freedom from illness.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

The authors are grateful for discussions of this research with Will Dow, Felix Elwert, Amar Hamoudi, Dana Garbarksi, David Kaplan, Kaja LeWinn, John Mullahy, Bondan Sikoki, participants in the Health Disparities Working Group at UCSF and the Health Econometrics Working Group at the University of Wisconsin. The authors

gratefully acknowledge funding from the Robert Wood Johnson Foundation and support from Wisconsin's Center for Demography and Ecology. All opinions and errors are those of the authors.

References

- Adelman, Larry. *Unnatural Causes: Is Inequality Making Us Sick? Preventing Chronic Disease*. 2007; 4
- Adler, Nancy E.; Epel, Elissa S.; Castellazzo, Grace; Ickovics, Jeannette R. Relationship of subjective and objective social status with psychological and physiological functioning. *Health Psychology*. 2000; 19:586–592. [PubMed: 11129362]
- Albrecht, Gary L.; Walker, Vivian G.; Levy, Judith A. Social Distance from the Stigmatized: A Test of Two Theories. *Social Science & Medicine*. 1982; 16:1319–27. [PubMed: 6214849]
- Alderman, Harold; Hoddinott, John; Kinsey, Bill. Long term consequences of early childhood malnutrition. *Oxford Economic Papers*. 2006; 58:450–474.
- Alexander, C Norman. Status Perceptions. *American Sociological Review*. 1972; 37:767–773.
- Allison, Paul. *Fixed Effects Regression Models*. Los Angeles: Sage Publications; 2009.
- Bago d'Uva T, Van Doorslaer E, Lindeboom M, O'Donnell O. Does Reporting Heterogeneity Bias the Measurement of Health Disparities? *Health Economics*. 2008; 17:351–75. [PubMed: 17701960]
- Baldwin, Marjorie L.; Zeager, Lester A.; Flacco, Paul R. Gender Differences in Wage Losses from Impairments: Estimates from the Survey of Income and Program Participation. *The Journal of Human Resources*. 1994; 29:865–887.
- Barber, Sarah L.; Gertler, Paul J.; Harimurti, Pandu. Differences In Access To High-Quality Outpatient Care In Indonesia. *Health Aff*. 2007; 26:w352–366.
- Baum CL, Ford WF. The Wage Effects of Obesity: a longitudinal study. *Health Economics*. 2004; 13:885–899. [PubMed: 15362180]
- Bollen, Kenneth A.; Brand, Jennie E. A General Panel Model with Random and Fixed Effects. *Social Forces*. 2010; 89(1):1–34.
- Campbell, DT. From Description to Experimentation: Interpreting trends as quasi-experiments. In: Harris, CW., editor. *Problems in Measuring Change*. Madison: University of Wisconsin Press; 1963.
- Cantril, Hadley. *The Patterns of Human Concerns*. New Brunswick: Rutgers University Press; 1965.
- Chen, Edith; Paterson, Laurel Q. Neighborhood, Family, and Subjective Socioeconomic Status: How Do They Relate to Adolescent Health? *Health Psychology*. 2006; 25:704–714. [PubMed: 17100499]
- Cooley, Charles H. *Social Organization: a Study of the Larger Mind*. C. Scribner's sons; 1909.
- Demakakos, Panayotes; Nazroo, James; Breeze, Elizabeth; Marmot, Michael. Socioeconomic Status and Health: The role of subjective social status. *Social Science & Medicine*. 2008; 67:330–340. [PubMed: 18440111]
- Desai S, Alva S. Maternal education and child health: Is there a strong causal relationship? *Demography*. 1998; 35:71–81. [PubMed: 9512911]
- Fernald, Lia CH.; Adler, Nancy E. Blood Pressure and Socioeconomic Status in Low-Income Women in Mexico. *Journal of Epidemiology and Community Health*. 2008; 62:e8. [PubMed: 18431833]
- Fincham FD, Harold GT, Gano-Phillips S. The longitudinal association between attributions and marital satisfaction. *Journal of Family Psychology*. 2000; 14:267. [PubMed: 10870294]
- Frankenberg, Elizabeth; Thomas, Duncan. *The Indonesia Family Life Survey (IFLS): Study Design and Results from Waves 1 and 2*. DRU-2238/1-NIA/NICHD. 2000
- Frankenberg, Elizabeth; Jones, Nathan R. Self-Rated Health and Mortality: Does the Relationship Extend to a Low Income Setting? *Journal of Health and Social Behavior*. 2004; 45:441–452. [PubMed: 15869115]
- Franzini, Luisa; Fernandez-Esquer, Maria Eugenia. The association of subjective social status and health in low-income Mexican-origin individuals in Texas. *Social Science & Medicine*. 2006; 63:788–804. [PubMed: 16580107]

- Friestad, Christine; Klepp, Knut-Inge. Socioeconomic Status and Health Behaviour Patterns through Adolescence. *The European Journal of Public Health*. 2006; 16:41–47.
- Garbarski, Dana. Perceived Social Position and Health: Is There a Reciprocal Relationship? *Social Science & Medicine*. 2010; 70:692–699. [PubMed: 20006415]
- Gianaros, Peter J.; Horenstein, Jeffrey A.; Cohen, Sheldon; Matthews, Karen A.; Brown, Sarah M.; Flory, Janine D.; Critchley, Hugo D.; Manuck, Stephen B.; Hariri, Ahmad R. Perigenual anterior cingulate morphology covaries with perceived social standing. *Social Cognitive and Affective Neuroscience*. 2007; 2:161–173. [PubMed: 18418472]
- Gubhaju, Bhakta. Fertility Transition and Population Ageing in the Asian and Pacific Region. *Asia-Pacific Population Journal*. 2008; 23:55–80.
- Gunasekara, Fiona Imlach; Carter, Kristie; Blakely, Tony. Change in income and change in self-rated health: Systematic review of studies using repeated measures to control for confounding bias. *Social Science & Medicine*. 2011; 72:193–201. [PubMed: 21146277]
- Haas, Steven A. Health Selection and the Process of Social Stratification: The Effect of Childhood Health on Socioeconomic Attainment. *Journal of Health and Social Behavior*. 2006; 47(4):339–354. [PubMed: 17240924]
- Hamad R, Fernald LCH, Karlan DS, Zinman J. Social and economic correlates of depressive symptoms and perceived stress in South African adults. *Journal of Epidemiology and Community Health*. 2008; 62:538–544. [PubMed: 18477753]
- Haveman, Robert; Wolfe, Barbara. The economics of disability and disability policy. In: Anthony, JC.; Joseph, PN., editors. *Handbook of Health Economics*. Vol. 1. Elsevier; 2000. p. 995-1051.
- Hu P, Adler NE, Goldman N, Weinstein M, Seeman TE. Relationship Between Subjective Social Status and Measures of Health in Older Taiwanese Persons. *Journal of the American Geriatrics Society*. 2005; 53:483–488. [PubMed: 15743294]
- Jackman, Mary R.; Jackman, Robert W. An Interpretation of the Relation Between Objective and Subjective Social Status. *American Sociological Review*. 1973; 38:569–582. [PubMed: 4745630]
- Jackson, Margot I. Understanding Links between Adolescent Health and Educational Attainment. *Demography*. 2009; 46:671–694. [PubMed: 20084824]
- Kawachi I, Adler NE, Dow WH. Money, schooling, and health: Mechanisms and causal evidence. *Annals of the New York Academy of Sciences*. 2010; 1186:56–68. [PubMed: 20201868]
- Kivimäki M, Feldt T, Vahtera J, Nurmi JE. Sense of coherence and health: evidence from two cross-lagged longitudinal samples. *Social Science & Medicine*. 2000; 50:583–597. [PubMed: 10641809]
- Kline, Rex B. *Principles and Practice of Structural Equation Modeling*. New York: Guilford Press; 2005.
- Kluegel, James R.; Singleton, Royce, Jr; Starnes, Charles E. Subjective Class Identification. *American Sociological Review*. 1977; 42:599–611.
- Kopp M, Skrabski A, Réthelyi J, Kawachi I, Adler NE. Self-rated Health, Subjective Social Status, and Middle-Aged Mortality in a Changing Society. *Behavioral Medicine*. 2004; 30:65–70. [PubMed: 15648126]
- Leeuwen, Bas van. PhD Thesis. Universiteit Utrecht; The Netherlands: 2007. Human capital and economic growth in India, Indonesia, and Japan : a quantitative analysis, 1890-2000.
- Lemeshow, Adina R.; Fisher, Laurie; Goodman, Elizabeth; Kawachi, Ichiro; Berkey, Catherine S.; Colditz, Graham A. Subjective Social Status in the School and Change in Adiposity in Female Adolescents. *Arch Pediatr Adolesc Med*. 2008; 162:23–28. [PubMed: 18180408]
- Levinsohn, James; Berry, Steven; Friedman, Jed. Impacts of the Indonesian Economic Crisis: Price Changes and the Poor. In: Dooley, M.; Frankel, J., editors. *Managing Currency Crises in Emerging Markets*. University of Chicago Press; 2003.
- Link, Bruce G.; Phelan, Jo C. Understanding sociodemographic differences in health--the role of fundamental social causes. *Am J Public Health*. 1996; 86:471–473. [PubMed: 8604773]
- Little TD, Preacher KJ, Selig JP, Card NA. New developments in latent variable panel analyses of longitudinal data. *International Journal of Behavioral Development*. 2007; 31:357.
- Macleod, John; Smith, George Davey; Metcalfe, Chris; Hart, Carole. Is Subjective Social Status a More Important Determinant of Health than Objective Social Status? *Social Science & Medicine*. 2005; 61:1916–1929. [PubMed: 15916842]

- Marmot, Michael G. *The status syndrome: How social standing affects our health and longevity*. New York: Times Books; 2004.
- McEwen, Bruce S.; Gianaros, Peter J. Central Role of the Brain in Stress and Adaptation: Links to Socioeconomic Status, Health, and Disease. *Annals of the New York Academy of Sciences*. 2010; 1186:190–222. [PubMed: 20201874]
- Nitisastro, Widjojo. *Population trends in Indonesia*. Ithaca: Cornell University Press; 1970.
- Operario, Don; Adler, Nancy E.; Williams, David R. Subjective social status: reliability and predictive utility for global health. *Psychology & Health*. 2004; 19:237–246.
- Powdthavee, Nattavudh. Feeling Richer or Poorer than Others: A Cross-section and Panel Analysis of Subjective Economic Status in Indonesia. *Asian Economic Journal*. 2007; 21:169–194.
- Powdthavee, Nattavudh. How Important is Rank to Individual Perception of Economic Standing? A Within-Community Analysis. *Journal of Economic Inequality*. 2009; 7:225–248.
- Radloff, Lenore Sawyer. The CES-D Scale: A Self-Report Depression Scale for the General Population. *Applied Psychological Measurement*. 1977; 1(3):385–401.
- Ravallion M, Lokshin M. Identifying Welfare Effects from Subjective Questions. *Economica*. 2001; 68:335–357.
- Reitzel, Lorraine R., et al. The Influence of Subjective Social Status on Vulnerability to Postpartum Smoking Among Young Pregnant Women. *Am J Public Health*. 2007; 97:1476–1482. [PubMed: 17600249]
- Ritterman, Miranda Lucia; Fernald, Lia C.; Ozer, Emily J.; Adler, Nancy E.; Gutierrez, Juan Pablo; Syme, S Leonard. Objective and subjective social class gradients for substance use among Mexican adolescents. *Social Science & Medicine*. 2009; 68:1843–1851. [PubMed: 19342140]
- Sanders AE, Slade GD, Turrell G, John Spencer A, Marcenes W. The Shape of the Socioeconomic–Oral Health gradient. *Community Dentistry and Oral Epidemiology*. 2006; 34:310–319. [PubMed: 16856951]
- Schnittker, Jason; McLeod, Jane D. The Social Psychology of Health Disparities. *Annual Review of Sociology*. 2005; 31:75–103.
- Singh-Manoux, Archana; Adler, Nancy E.; Marmot, Michael G. Subjective Social Status: its determinants and its association with measures of ill-health in the Whitehall II study. *Social Science & Medicine*. 2003; 56:1321–1333. [PubMed: 12600368]
- Singh-Manoux, Archana; Marmot, Michael G.; Adler, Nancy E. Does Subjective Social Status Predict Health and Change in Health Status Better Than Objective Status? *Psychosom Med*. 2005; 67:855–861. [PubMed: 16314589]
- Smith, James P. Unraveling the SES-Health Connection. *Population and Development Review*. 2004; 30:108–132.
- Stoddard, Pamela J. Socioeconomic Gradients in Health in Indonesia. Paper presented at the APHA Annual Meeting; Boston. 2006.
- Strauss, John; Thomas, Duncan. Health over the Life Course. In: Schultz, TP.; Strauss, J., editors. *Handbook of Development Economics*. Vol. 4. Amsterdam: 2008.
- Strauss J, Witoelar F, Sikoki B, Wattie AM. The Fourth Wave of the Indonesian Family Life Survey (IFLS4): Overview and Field Report. WR-675/1-NIA/NICHD. 2009
- Susman, Joan. Disability, Stigma, and Deviance. *Social Science and Medicine*. 1994; 38:15–22. [PubMed: 8146705]
- Thomas, Duncan; Frankenberg, Elizabeth, et al. Causal Effect of Health on Labor Market Outcomes: Experimental Evidence. Paper presented at Population Association of America Meetings; Boston. 2004.
- Wilkinson, Richard G. *Unhealthy Societies : the afflictions of inequality*. London; New York: Routledge; 1996.
- Wilkinson, Richard G.; Pickett, Kate. *The Spirit Level: Why greater equality makes societies stronger*. New York: Bloomsbury; 2009.

Highlights

- Study revisits the subjective socioeconomic status-health link to clarify the interpretation of this widely-reported association.
- Demonstrates a robust relationship between perceived social status and multiple measures of health in a low-income population.
- Analysis employs statistical methods with panel data that rule out several artifactual explanations of this relationship.
- Results question dominant portrayal of relationship as unidirectional; equally strong support for reverse pathway: health influences subjective status.
- Among older Indonesians, perceived status decreases with declining health, net of changes to individual economic profiles.

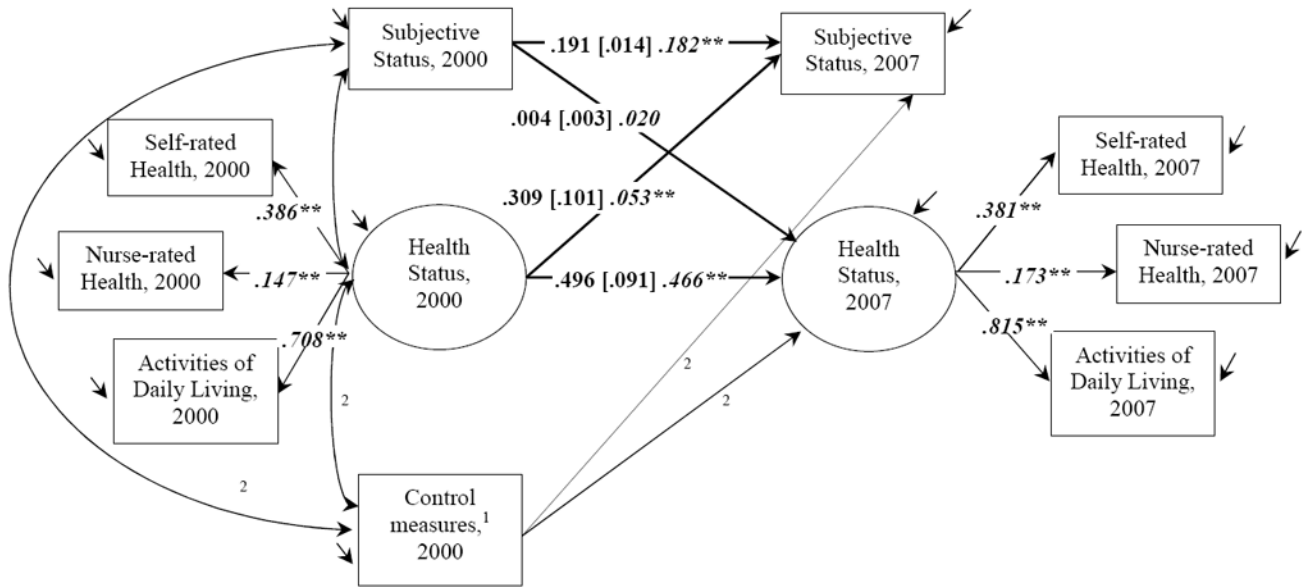


Figure 1. Cross-Lagged Panel Model with Latent Health Status Indicators in 2000 and 2007, Indonesian adults age 35 and older in 2000 (n=8430)

*p<0.05 **p<0.01

Note: Unstandardized regression coefficients with standard errors in brackets followed by standardized coefficients in italics. For presentation simplicity, only the standardized coefficients are shown for the measurement model of health status in both years.

¹Control measures include assets (index), education (in years), household size, age (in years), gender, and urban residence.

²Each control measure is allowed to have an independent direct effect on subjective status and health status in 2007. For ease of presentation, the 14 arrows are omitted. Similarly, the control variables are allowed to have a non-zero correlation with the other variables measured in 2000; arrows not shown.

Table 1

Descriptive Statistics, Indonesian Adults Age 35 and older in 2000 (N=8,430)

	2000	2007	% Increasing	% Decreasing	Pearson Correlation
Subjective status	2.88	2.81	25	30	0.29**
ADL Score	19.30	18.81	17	32	0.39**
Self-Rated Health	2.94	2.90	15	20	0.16**
Nurse's Health Rating	5.97	5.67	24	46	0.23**
Household Expenditures (ln)	13.49	14.30	85	15	0.44**
Assets	3.30	3.60	44	25	0.70**

**
p<=0.01

^a ADL refers to the activities of daily living scale. Higher values indicate greater ease of activity.

Note: Descriptive statistics are weighted using the IFLS 2000 and 2007 person weights.

Source: Indonesia Family Life Survey

Table 2

Estimated Regression Coefficients Predicting Reported and Measured Health Outcomes, Indonesian adults aged 35 and over (n=8430)

		ADL ^b Score	Self-Rated Health	Nurse-Rated Health
<i>A. 2007 Covariates</i>				
Subjective Status		0.062* [0.030]	0.053** [0.008]	0.085** [0.019]
<i>B. 2007 Covariates</i>				
Subjective Status		0.089** [0.031]	0.055** [0.008]	0.040* [0.017]
Education: ^a	0 years	-0.102 [0.111]	0.023 [0.023]	-0.068 [0.063]
	1-5 years	-0.109 [0.078]	-0.032 [0.019]	-0.034 [0.045]
	6 years	0.006 [0.069]	-0.021 [0.018]	-0.020 [0.038]
Household Expenditures (ln)		-0.086* [0.035]	-0.019* [0.007]	0.080** [0.017]
Household Assets		-0.020 [0.023]	0.006 [0.005]	0.024+ [0.013]
<i>C. 2007 Covariates</i>				
Subjective Status		-0.006 [0.029]	0.033** [0.008]	0.035* [0.017]
Education: ^a	0 years	-0.032 [0.014]	0.040+ [0.022]	-0.064 [0.063]
	1-5 years	-0.028 [0.074]	-0.014 [0.018]	-0.030 [0.045]
	6 years	0.011 [0.067]	-0.020 [0.017]	-0.020 [0.039]
Household Expenditures (ln)		-0.073* [0.033]	-0.016* [0.007]	0.080** [0.013]
Household Assets		-0.045* [0.022]	0.000 [0.005]	0.023+ [0.013]
CES-D scale of Depression		-0.174** [0.011]	-0.040** [0.002]	-0.009* [0.004]
<i>D. Pooled 2000 and 2007 Data</i>				
Subjective Status		0.035 [0.027]	0.014* [0.007]	0.048** [0.013]
Individual Fixed Effects		Yes	Yes	Yes
Time varying expenditure and asset controls		Yes	Yes	Yes
R-squared	(panel A)	0.20	0.04	0.06
	(panel B)	0.21	0.04	0.07
	(panel C)	0.26	0.10	0.08
	(panel D)	0.16	0.01	0.05

+ p <=0.10

* p<0.05

** p<=0.01 (two-tailed tests)

^aThe omitted category of education is 7 years or more.

^bADL refers to the activities of daily living scale. Higher values indicate greater ease of activity.

Standard errors in brackets adjusted for clustering at the community level. All regressions include measures of age (in years), sex, household size, urban vs. rural region of residence. Per capita household expenditures are logged.

Table 3

Individual Fixed Effect Regressions of Subjective Status on Health and Economic Indicators Using Pooled Data Measured in 2000 and 2007, Indonesian Adults Age 35 and Older in 2000. (n=16860)

	Subjective Status		
	(1)	(2)	(3)
<i>A. All Respondents</i>			
ADL Score ^d	0.006 [0.004]		
Self-Rated Health		0.034* [0.017]	
Nurse-Rated Health			0.034** [0.009]
Assets	0.040** [0.008]	0.040** [0.008]	0.039** [0.008]
Household Expenditures (ln)	0.049** [0.011]	0.049** [0.011]	0.048** [0.011]
Constant	1.974** [0.169]	1.985** [0.154]	1.888** [0.155]
<i>B. Excluding Respondents Exhibiting Improvements on Health Measures</i>			
	n=14012	n=14364	n=12856
ADL Score ^d	0.014** [0.005]		
Self-Rated Health		0.053* [0.025]	
Nurse-Rated Health			0.050** [0.015]
Assets	0.038** [0.008]	0.035** [0.008]	0.033** [0.009]
Household Expenditures (ln)	0.044** [0.012]	0.048** [0.012]	0.046** [0.013]
Constant	1.882** [0.193]	1.982** [0.172]	1.821** [0.192]
R-squared	(panel A)		
	(panel B)		
	0.14	0.14	0.13
	0.13	0.13	0.12

⁺ p <= 0.10

* p < 0.05

** p <= 0.01 (two-tailed tests)

^a ADL refers to the activities of daily living scale. Higher values indicate greater ease of activity.

Note: Standard errors in brackets are adjusted for clustering at the community level. Per capita household expenditures are logged. All regressions include a time-varying measure of household size and a year-specific fixed effect. Time-invariant covariates, like education, are captured by the fixed effect.

Source: Indonesia Family Life Survey