Health, Income, and Economic Development

Anne Case

There is a strong positive relationship between income and health throughout the world. If part of this association represents a causal effect from income to health, the maintenance and support of incomes become a potential policy instrument for promoting health among specific populations or groups. Policies for income support, such as transfers to poor people or the elderly, are instruments that should be assessed, along with the provision of health services, for their ability to improve health. Whether there is a causal link from income to health, and its size, are important research issues for those interested in health in developing countries. This article uses data from an integrated survey of health and economic well-being in South Africa to examine the impact of the old age pension on the health of pensioners and the prime-age adults and children who live with them. It finds evidence of a large and causal effect of income on health status, one that works at least in part through improved sanitation and living standards, in part through better nutritional status, and in part through reduced psychosocial stress. The pension is used to upgrade household facilities, and some of the improvements have health consequences. Governments interested in improving health status may find the provision of cash benefits to be one of the most effective policy tools available to them. Cash provides a yardstick against which other health interventions should be measured.

Other articles on health and development in this volume focus on health service delivery. It is generally implicit in such a focus that access to health services, and the quality of care administered, are the central determinants of health outcomes. It is a short step from there to taking improvements in the delivery of health care as a central focus for an organization like the World Bank. Such a focus is consonant with the World Health Organization's (WHO) (2000, p. 9) World Health Report 2000, which stresses the importance of health delivery in health out-
comes, claiming that “numerous studies beginning in the 1970s have consistently
found that preventable deaths...have fallen at a faster rate than other deaths.” The
WHO report claims that where the connection between health delivery and health
outcomes is weak, inefficient delivery is the cause.

In this article, without denying the importance of medical services, the focus
shifts to the role of income in promoting health. This is an area largely untouched
by economists, although it has long been a focus of public health research (see Adler
and Ostrove [1999] for an overview). Within countries income is strongly correlated
with health outcomes, and policy recommendations that provide for income trans-
fers to the poor or the promise of increased earnings capacity may prove to be as
important for health outcomes as those calling for additional funds for service pro-
vision, especially in settings where the capacity to deliver health services is weak.

An understanding of whether and how income generates better health is im-
portant for public health policy because the share of resources devoted to different
policy options should depend on their relative effectiveness. This is not to gainsay
the importance of public health campaigns to provide clean water, eradicate malaria,
vaccinate children, deliver AIDS drugs in developing countries, or improve the qual-
ity of health services or access to them. However, weak links in the chain of public
provision identified by many researchers (see Filmer, Hammer, and Pritchett [2000]
for an overview) strengthen the case for considering alternatives and for quantifying
the causal impact of income on health outcomes.

The efficacy of spending money to improve health delivery should be weighed
against that of, say, improving school quality or increasing educational attainment
to promote health. The relative merits of a new school or a new clinic should also be
weighed against those of increasing the incomes of the poor as a method of improv-
ing health outcomes. Poor people may spend part of this additional income on med-
cal care or on goods associated with better health—more nutritional food, better
housing, or safer places to live, for example. They may also derive health benefits
directly from money, for example, by relieving the stress and susceptibility to infec-
tion associated with the daily trials of coping on inadequate income.

Health improvement through income redistribution has become a strategy
Inequalities in Health Report, commissioned to study health inequalities and ways
to reduce the growing gaps in illness and death in the United Kingdom, recom-
ended “policies which will further reduce income inequalities” (p. 36) as a mecha-
nism to improve the health of the poor. An understanding of the merits of these
different mechanisms is of first-order importance.

This article provides estimates of the causal impact of income on health outcomes
in one transition economy, South Africa. South Africa’s experience is interesting for
many reasons. South Africa is a transition economy with both a “developed” coun-
try population and a “developing” country population. Access to first world medical
care, although largely limited by race and wealth, is available to some of South
Africa’s poor. (Historically many poor people in Cape Town used Groote Schuur
Hospital—home of the world’s first successful heart transplant—as their local clinic,
while those in rural areas struggled with poorly provisioned clinics.) South Africa
has also witnessed many innovative policy experiments since the change of govern-
ment in 1994, including the provision of large pensions to all elderly citizens. The
old age pension is used here to estimate the causal effect of income on health.

The Health Gradient

People in wealthier countries live longer and have lower rates of illness, on average, than
do people in poorer countries. Within countries, wealthier people live longer than
poorer people, and as countries become wealthier average life expectancy increases. This
phenomenon is not limited to the bottom end of the income or wealth distribution.
Indeed, the gradient in health status—the phenomenon that relatively wealthier people
have better health and longevity—is evident throughout the income distribution.

Evidence on the relationship between income and health comes from historical
analyses, cross-country comparisons, and country analyses using microeconomic
data. (The literature is vast, and only a small part of it is mentioned here, to provide
context.) McKeown (1976) and Fogel (1994) have argued that improvements in
longevity in the 19th century were driven not by advances in medicine or public
health but by improvements in nutrition, largely a result of higher incomes. Other
researchers, including Preston (1975, 1980), Saxer (1988), and Easterlin (1998,
1999), present historical and cross-country evidence on shifts in the health produc-
tion function, shifts they attribute less to income or income growth than to public
health efforts (particularly sanitation, vaccination, and vector control) and to
advances in health technologies, such as antibiotics.

At the microeconomic level researchers have used household or individual-level
data to document a significant positive relationship between income and measures
of health status in both developed and developing countries. For developed coun-
tries both a channel from health status to income and feedback from income to
health are expected (Smith 1999; Adler and others 1994). For developing countries
much of the research on the connection between income and health has focused on
infant mortality, for which the feedback from health to income is quite limited (see,
for example, Gwatkin [2000] and Wagstaff [2000]).

Even if one accepts that public health and health technology have reduced mortality
in rich countries over time and in developing countries since World War II and that bet-
ter delivery of health services is an important goal in poor countries, it is important
to explore the use of income transfers as a tool of health policy. If individual income
is causally related to individual health, and if organizational capacity, political will, or con-
trol of corruption hampers service delivery, income transfers may do more for the health
of the poor than would committing more money to an ineffective health delivery system.

Difficulties Quantifying the Causal Effects of Income

Whether and how money can be exchanged for better health have proved difficult
to quantify, particularly for working-age adults, not least because pinning down the
effect of income on health is difficult when health simultaneously influences income. In addition, the mechanisms through which money is translated into health may vary with the level of development; no single mechanism (or set of mechanisms) may be at work everywhere. Finally, until recently there have been few sources of data with the details about both health and income needed to allow reasonable micro-level examinations of the phenomenon.

If people are observed at only one point in time and if illness causes them to work fewer hours, they will be observed to have low health status and low income. One would not want to conclude that the current lack of income caused the illness. Quantifying the impact of income on health requires a tool that separates the correlation working from health to income from that working from income to health. This is not always possible, nor is it always possible to rule out a role for third factors—variables that determine both income and health status.

The causes of poor health status in the developing world may have little in common with those in industrial countries. In developing countries the risks may be primarily from infectious disease, lack of clean drinking water, and inadequate diet. In industrial countries the risks may be primarily from chronic diseases associated with lifestyle and reduced physical activity. The causal links between health and income may be specific to the diseases people face, and for this reason, quantifying those links may be especially difficult in transition economies, where people living in the same household may be struggling against both infectious disease (the “unfinished agenda” of developing countries) and chronic disease and violence (the “emerging agenda” of industrial countries; Kahn and others 1999); obese women may be living near or with malnourished children (Case and Wilson 2001). The challenge of comparing across levels of development may be rewarded, however, if such comparisons bring to light universal mechanisms at work. (Psychosocial stress is apt to be found in every environment, to take one example; see Marmot [1999].)

In many developing countries health authorities see little need for health surveys, apart from measuring access to health facilities, and the surveys that are conducted tend to focus on reproductive health. On the public health side there has been little appreciation of the need to incorporate direct health measures into survey methodology. And on the economic side there is too great a focus on household surveys and too little on individuals, even though health is a characteristic of individuals, not households. Few economic surveys ask questions about health status, and few focus on the whole life cycle, looking at children, adults, and the elderly. This makes it difficult to examine interactions between these groups and the intergenerational transmission of health or to predict the effects of aging. Moreover, because children and the elderly are less likely to work than adults, the lack of attention to them deprives researchers of a tool for disentangling the links between income and health.

Two of the most important sources of data for household- or individual-level analysis in developing countries, the Demographic and Health Surveys and the Living Standards Measurement Study surveys, were not designed to analyze the interaction between income and health. The Demographic and Health Surveys contain no information on household income and focus primarily on reproductive health. The Living Standards Measurement Study surveys generally contain detailed information on consumption and income but very limited (if any) information on health status. Integrated household surveys that collect data for individuals on economics and health can be used to explore the welfare consequences and interactions of different deprivations. Economists, in collaboration with physicians and other social scientists, can do much to find out how poverty and ill health, separately and in interaction, determine well-being.

The South African Integrated Family (Langeberg) Survey

A team of researchers in the United States and South Africa developed an instrument for linking information on individual and household economic well-being with the health and mental health status of household members, with an eye toward identifying causal links in the income-health gradient. The instrument includes questions on household resources, control over those resources within households, physical health of adults and children, mental health of adults, access to medical services, and a broad set of questions on other aspects of well-being, including social integration, exposure to violence, and the death of family members and friends. The survey was used in 1999 to collect data from a racially stratified random sample of 300 households (1,300 individuals) in the Langeberg health district in the Western Cape, an area that contains a mix of Black, White, and Coloured communities. (See Case and Wilson [2001] for additional details on the survey)

Measured along most economic and health dimensions, Blacks are less well off than are Coloureds, and Coloureds are less well off than are Whites (table 1). The mean monthly income of adult respondents was R511 rand (R) for Blacks, R936 for Coloureds, and R2,968 for Whites—or roughly a sixfold difference in monthly incomes for Blacks and Whites. The differences are even more stark when calculated as per person income figures (as shown in the lower panel in table 1). Blacks on average live in larger households (4.4 members) than Whites (2.8 members), with larger numbers of children (1.7 for Blacks and 0.8 for Whites).

Every adult in the survey was asked: How would you describe your health at present? Would you say it is excellent, good, average, poor, or very poor? Answers were scored from 1 (excellent) to 5 (very poor). Poor self-reported health has been shown to be a powerful predictor of mortality, even when controls were used for current health status and behaviors. Recent work has also found that self-ratings of poor health are a significant predictor of changes in functioning among the elderly. (See Idler and Kasl [1995] for results on changes in functioning and for extensive references on the studies of self-reported health and mortality.)

Blacks reported poorer health on average: 19 percent of Black adults reported themselves to be in poor or very poor health, true of only 8 percent of Coloureds and Whites. This is true even though Whites in the Langeberg health district (a popular retirement area for Whites) are older on average than are Blacks or Coloureds: the mean age was 49.5 years for White adult respondents, 37.6 years for Black adults, and 38.7 years for Coloured adults.
Evidence on Health Status and Income from the Langeberg Survey

For all three races there is a negative and significant relationship between a respondent’s income from all sources and health status (table 2), measured using the five-point scale introduced above. For all three races a doubling of income is associated with a two-tenths of one point betterment of health status (lower numbers are associated with better health). That the gradient is strong for all three races, whose levels of income vary markedly, is consistent with results presented by Adler and others (1994, p. 15), who provide evidence that “the association of SES [socioeconomic status] and health occurs at every level of the SES hierarchy, not simply below the threshold of poverty.”

The health of Blacks deteriorates more rapidly with each year of age than does the health of Coloureds. Blacks on average reported a 0.03-point worsening of health with each year of age, while Coloureds reported a 0.02-point worsening. Whites “age” more slowly: one year of age worsens reported health by 0.015 point—just half that reported for Blacks. For Blacks a doubling of income (a move, for example, from the median to the 67th percentile of the income distribution) is comparable to turning back the age clock by seven years: both are associated with an improvement in self-reported health status of 0.2 point.

The gradient in adult health is not eliminated when controls are added for education. In fact, educational attainment is not strongly correlated with health status for Blacks or Coloureds. For Blacks there is a small and significant relationship between education and health status in some specifications. For Coloureds there is no significant correlation in any specification. For Whites education and income both appear to be significantly correlated with health status, and the inclusion of education reduces the impact of income on health status by one-third (from 0.3 to 0.2 point). The differential effects of education across races are difficult to interpret here: the quality of South African schools varied markedly by race in the apartheid years (see Case and Deaton 1999). As school quality improves for Coloured and Black children, education may show a stronger impact on health status.

Table 1. Summary Statistics for the Langeberg Survey 1999

<table>
<thead>
<tr>
<th>Means</th>
<th>Black</th>
<th>Coloured</th>
<th>White</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondent’s income (rand per month)</td>
<td>2,968</td>
<td>2,576</td>
<td>1,934</td>
</tr>
<tr>
<td>Indicator: respondent works for money</td>
<td>0.297</td>
<td>0.296</td>
<td>0.300</td>
</tr>
<tr>
<td>Self-reported health status (1 = excellent, 5 = very poor)</td>
<td>2.33</td>
<td>2.31</td>
<td>2.23</td>
</tr>
<tr>
<td>Indicator: asthma</td>
<td>0.087</td>
<td>0.093</td>
<td>0.094</td>
</tr>
<tr>
<td>Indicator: tuberculosis</td>
<td>0.091</td>
<td>0.091</td>
<td>0.084</td>
</tr>
<tr>
<td>Indicator: cancer</td>
<td>0.110</td>
<td>0.110</td>
<td>0.110</td>
</tr>
<tr>
<td>Indicator: heart trouble</td>
<td>0.072</td>
<td>0.072</td>
<td>0.074</td>
</tr>
<tr>
<td>Indicator: stroke</td>
<td>0.077</td>
<td>0.077</td>
<td>0.077</td>
</tr>
<tr>
<td>Indicator: high cholesterol</td>
<td>0.162</td>
<td>0.162</td>
<td>0.162</td>
</tr>
<tr>
<td>Indicator: diabetes</td>
<td>0.075</td>
<td>0.075</td>
<td>0.075</td>
</tr>
<tr>
<td>Indicator: emphysema</td>
<td>0.075</td>
<td>0.075</td>
<td>0.075</td>
</tr>
<tr>
<td>Indicator: both chronic and infectious disease</td>
<td>0.075</td>
<td>0.075</td>
<td>0.075</td>
</tr>
<tr>
<td>Age</td>
<td>38.7</td>
<td>38.7</td>
<td>38.7</td>
</tr>
<tr>
<td>Indicator: female</td>
<td>0.508</td>
<td>0.508</td>
<td>0.508</td>
</tr>
<tr>
<td>Number of observations</td>
<td>224</td>
<td>224</td>
<td>224</td>
</tr>
</tbody>
</table>

Household-level data

| Total household income per member | 2,141.8 |
| Indicator: no income pooling | 0.174 |
| Indicator: woman has a say* | 0.756 |
| Household size | 4.44 |
| Number members ages 0-17 | 1.90 |
| Number members ages 18-54 | 2.51 |
| Number members ages 55+ | 0.40 |
| Number of observations | 100 |

Note: The analysis uses the apartheid classification of “Black” and “Coloured,” in part because the labels carry with them information about the long-term deprivation faced during the apartheid era. Sample means are weighted based on the 1996 South African census, taking into account the stratification of the sample (by race) and the clustering of observations (by enumerator area).

In the Langeberg district most reported having access to some branch of the health care system and having been examined by a health care professional. Blacks and Coloureds were more likely to report that a doctor or nurse or health care professional had told them that they have asthma or tuberculosis (see table 1). Roughly 4 percent of Black and Coloured adults reported both tuberculosis and a chronic disease (cancer, heart trouble, stroke, diabetes, or emphysema), true for less than 1 percent of Whites.

With respect to household decisionmaking, 13 percent of Black households report that members do not pool their incomes. Roughly two-thirds of all households report that a woman is among those who have the most say in decisions about spending in the household. Pooling and the position of women in the decisionmaking hierarchy have been shown to be important in determining household resource allocation. (See Alderman and others [1995] and references therein.)

Table 2. Income and Health Status

<table>
<thead>
<tr>
<th>Controls</th>
<th>Black</th>
<th>South Africa (Coloured/White)</th>
<th>United States (Black/White)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log own income</td>
<td>-0.175 (0.068)</td>
<td>-0.163 (0.066)</td>
<td>-0.147 (0.037)</td>
</tr>
<tr>
<td>Age</td>
<td>0.029 (0.005)</td>
<td>0.030 (0.003)</td>
<td>0.031 (0.002)</td>
</tr>
<tr>
<td>Education</td>
<td>-0.036 (0.018)</td>
<td>0.010 (0.012)</td>
<td>-0.035 (0.035)</td>
</tr>
<tr>
<td>Number of observations</td>
<td>122</td>
<td>122</td>
<td>250</td>
</tr>
</tbody>
</table>

Note: The analysis uses the apartheid classification of “Black” and “Coloured,” in part because the labels carry with them information about the long-term deprivation faced during the apartheid era. The dependent variable is health status (1 = excellent, 5 = very poor). Numbers in parentheses are standard errors. South African regressions are weighted based on the 1996 South African census, taking into account the stratification of the sample (by race) and the clustering of observations (by enumerator area). Income for the National Health Interview Survey is total household income. Both the U.S. and South African samples are weighted to adults ages 18 and older.

Source: Columns 1-6, The Langeberg Survey 1999 [www.uct.ac.za/depts/sansd]; columns 7-8, the U.S. National Health Interview Survey 1996-97.
The gradient in health status in South Africa is identical to that in the United States. The last two columns of Table 2 present results for Blacks and Whites in the United States using 10 years of data from the National Health Interview Survey. For both Whites and Blacks a doubling of income is associated with an improvement of 0.2 point in self-reported health status. As is true in South Africa, the health status of Blacks in the United States deteriorates faster with age than does that of Whites, and education is more protective of health for Whites. (The precision of the U.S. estimates, which allows differentiation between the Black and White coefficients, comes from the sample size: there are half a million White observations in the U.S. estimate.)

The fact that the gradient in health status is identical between the United States and South Africa would seem to rule out some factors as an explanation of the relationship. Access to and quality of health services differ markedly between the countries, as do the quality and average levels of education. In what follows, this article examines the South African results whether the correlation is due to the impact of health on earnings, the impact of money on health, or potentially some third factor that affects both health and income. Some of the mechanisms can be ruled in, and ruled out, using the data collected in the Langeberg Survey.

The Impact of Health on Income

Part of the correlation between income and health in South Africa is due to the reduced earnings potential of South Africans who have been chronically ill. Chronic illnesses have a large and significant effect on reported health status, as illustrated in column 1 of Table 3, which presents results of a regression of respondents' self-reported health status on responses about: whether a health professional has informed them that they have specific chronic conditions. This regression, which also includes controls for age, gender, and race, shows that asthma, tuberculosis, and cancer have large and significant effects on health status, with each worsening the reported status by more than half a point. Conditions associated with obesity (high cholesterol and diabetes) each worsen health status by three-tenths of a point on average.

That these chronic illnesses are related to labor force participation is seen in column 2 of Table 3, which presents results on reasons for retirement. The Langeberg Survey asked each older adult (ages 55 and above) whether they reduced the hours or changed the type of work they were doing as they got older. If the response was positive, an open-ended follow-up question asked why the change had occurred. Poor health was the modal response: being old, or old enough to receive a pension, was the second most frequent response. The dependent variable in column 2 is defined only for respondents who report retirement. It is an indicator variable that the retirement occurred because of poor health. For the 74 older adults who reported retirement, retirement due to poor health is significantly correlated with the same chronic conditions that led to the largest reduction in health status—asthma, tuberculosis, and cancer. The health conditions are jointly significant determinants of reporting that retirement was due to poor health (F-test = 10.56, p-value = 0.0000). This is prima facie evidence of a channel from poorer health to lower income, working through the effect of chronic disease on labor force participation.

The Impact of Income on Health

That a channel exists from health to income does not imply the absence of a channel from income to health. However, it does suggest caution in separating the effects. To investigate whether income has a causal effect on health requires identifying a source of income that is not itself determined by a respondent's health status. For South Africa this challenge is met by the state old age pension. Women ages 60 and older and men ages 65 and older are eligible for a monthly cash transfer if
they do not have an employer-based pension. Take-up rates for the state old age pension among Blacks and Coloureds are on the order of 80 percent (Case and Deaton 1998). White participation is only about 10 percent, because access to private pensions precludes take-up of the state pension for most Whites. Thus analysis here is restricted to Coloured and Black respondents.

In many communities in South Africa, where unemployment is as high as 40 percent, the state pension is the only stable source of income. It is also a large sum of money. At the time of the Langeberg Survey the old age pension was R520 per month, which is equal to the median income for adult Coloured respondents and is more than twice the median for Blacks (R220). The presence in the household of an age-eligible member is used as the marker for the pension, rather than receipt of the pension, to avoid modeling the timing of pension take-up.

Pension income should benefit prime-age adults and children living in a pensioner household, but only if incomes are pooled. In the Langeberg Survey 16 percent of Black and Coloured households (20 percent of adult respondents) reported that income was not pooled in their households. Pooling is not correlated with total household income, household size, the presence of pensioners in the household, or the gender of the pensioner. However, pooling is significantly more likely the smaller the age difference between the oldest and youngest adults in the household and the fewer the number of generations. Pooling is significantly less likely if a young adult (male or female) in the household reported working for money. This finding is consistent with pilot surveys in South Africa between 1996 and 1998, which found that younger working household members were often reluctant to pool resources with older members, choosing instead to make their own way (even while living under the same roof with their kin).

Thus information on both pension receipt and income pooling is used to identify a causal effect of income on health status. Figure 1 plots the conditional expectation of health status, given age, for Black and Coloured adults living in households that pool income. The conditional expectations are calculated using a Fan (1992) locally weighted regression smoother, which allows the data to determine the shape of the function, rather than imposing (for example) a linear or quadratic form. Health status by age is presented separately for respondents who are currently living with a pensioner and for those who are not. For both groups self-reported health status generally worsens with age. The improvement observed in self-reported health status between ages 20 and 35 for respondents living with pensioners is due in part to the higher probability of there being multiple pensioners in households with respondents 35 years old than in those with respondents 25 years old. This is explored in table 4 below.

Pension income protects the health of all adult members in households that pool income (see figure 1). For respondents in their 20s and continuing through adulthood, a gap in self-reported health status develops in favor of respondents living with a pensioner. For pensioners in households that pool income, health continues to worsen with age at roughly the same rate it does for members between the ages of 40 and 60. This does not imply that the pension does not improve the health of pensioners. If a woman were the first person in her household to become eligible for

![Figure 1. Self-Reported Health Status and Age for Respondents in Households That Pool Income, With and Without Pensioners, Black and Coloured Respondents](image)

**Self-reported health status**

- **Without pensioners**
- **Age at which women eligible for the pension**
- **With pensioners**

Source: The Langeberg Survey 1999.

the pension, she would be expected to fall on the upper "without pensioners" curve at age 59. At age 60, when she receives her pension, her health would be expected to improve, on average, and she would be expected to move to the lower "with pensioners" curve. Not only would her health be expected to improve, but so would that of other members of her household.

The results are sharply different for nonpooling households (figure 2). Again, there is a pronounced worsening of health with age. But there is much less of a difference in the health status of respondents, at any given age, with and without pensioners in their households. In contrast to the results for pooling households, the self-reported health status of respondents not living with a pensioner is slightly better. Once a respondent in a nonpooling household reaches pension age, health status stops declining altogether and begins to improve. Results presented in figures 1 and 2, then, suggest that the pension protects the health of all members when the household pools income and protects the health of pensioners only when the household does not pool.

Would the health of pensioners in pooling households be better on average if they lived in nonpooling households? Comparisons of health status for all respondents living with a pensioner in households that pool income and those that do not again show the protective effect of pension income on the health of all members of a pooling household (figure 3). At age 60 women coming into their pensions from a pooling household start life as a pensioner with better health than do those coming into their pensions from a nonpooling household. Not until age 70 does the ameliorating effect of the pension for pensioners in nonpooling households bring their health status into line with that observed for pensioners from pooling households.
Table 4. Pension Income, Income Pooling, and Health Status, Black and Coloured Adult Respondents

<table>
<thead>
<tr>
<th>Controls</th>
<th>Household income pooled</th>
<th>Household income not pooled</th>
<th>All households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Someone in household is eligible for a state pension</td>
<td>-0.395 (145)</td>
<td>-0.389 (186)</td>
<td>-0.261 (161)</td>
</tr>
<tr>
<td>One person in household is eligible for a state pension</td>
<td>-0.320 (145)</td>
<td>-0.339 (154)</td>
<td>-0.251 (130)</td>
</tr>
<tr>
<td>Two or more people in household are eligible for a state pension</td>
<td>-0.725 (214)</td>
<td>1.418 (275)</td>
<td>-0.534 (227)</td>
</tr>
<tr>
<td>Respondent is eligible for a state pension</td>
<td>-0.015 (306)</td>
<td>0.102 (303)</td>
<td>-0.018 (419)</td>
</tr>
<tr>
<td>Respondent is female</td>
<td>0.358 (104)</td>
<td>0.356 (110)</td>
<td>0.347 (116)</td>
</tr>
<tr>
<td>A woman has the most say in household spending</td>
<td>-0.076 (110)</td>
<td>-0.076 (112)</td>
<td>-0.076 (115)</td>
</tr>
<tr>
<td>&quot;Female&quot; interacted with &quot;A woman has the most say in spending&quot;</td>
<td>-0.218 (113)</td>
<td>-0.219 (117)</td>
<td>-0.208 (123)</td>
</tr>
<tr>
<td>Household does not pool income</td>
<td>0.051 (514)</td>
<td>0.025 (514)</td>
<td>0.054 (514)</td>
</tr>
</tbody>
</table>

Note: The analyses use the apartheid classifications of "Black" and "Coloured." In part because the labels carry with them information about the long-term deprivation faced during the apartheid era, the dependent variable is health status (1 = excellent...5 = very poor). Numbers in parentheses are standard errors. All regressions are weighted based on the 1996 South African census, taking into account the stratification of the sample (by race) and the clustering of observations by enumerator area. Included in all regressions but not shown in the table are respondents age, an indicator that respondent is Coloured, and age interacted with an indicator that respondent is Coloured. Source: The Langeberg Survey 1999 (www.uct.ac.za/legp/thedsa).

Figures 1 through 3 provide evidence that pension income is protective of health status. For pensioners living in nonpooling households, the beneficial effects of the pension accrue only to the pensioners and only on receipt of the pension. However, for pensioners living in income-pooling households, the beneficial effects of the pension accrue to all members.

The size of this effect, after controlling for other characteristics of the household and its members, is presented in table 4 for Black and Coloured respondents in households that pool income (the first set of columns) and those that do not (the second set). In households that pool resources, the presence of a pensioner improves self-reported health status on average by 0.4 point (column 1). No additional protection of the pension income accrues to the pensioners; an indicator that the respondent is a pensioner has a small coefficient (0.015) that is insignificantly different from zero (column 2). In contrast, being a pensioner in a nonpooling household has a large effect on self-reported health status (column 3). This difference in outcomes for pensioners in households that pool and those that do not appears in many of the results presented below.
When pensioner households are split into those with one pensioner and those with two or more pensioners (each pensioner receives R520 per month), the coefficient of having two or more pensioners in a pooling household is more than twice as large as that observed for one-pensioner households (last column in each panel of table 4). Again, being the pensioner provides no extra protection in households that pool. In households that do not pool, pensioners' health is 0.7 point better than that of other member.

There may be unobservable differences between pooling and nonpooling households that are correlated with health status and with the presence of pensioners. If so, these may bias the estimated impact of pension income on health status. To examine whether this is driving the findings, results are reported for all Black and Coloured respondents from both pooling and nonpooling households (last two columns of table 4). A significant effect of pension income on outcomes remains for all members, an effect that is larger than the average of the numbers of pensioners in the household. The results are attenuated relative to others reported in table 4 because households in which the pension helps all members (pooling households) are combined with those in which the pension protects only the elderly.

In pooling households women's health is significantly worse than men's health. However, women's health receives some protection if the woman is reported to have the "most say" in how household money is spent. For pooling households the variables indicating that a woman has the most say in spending and that indicator interacted with whether the respondent is a woman are jointly significant in all specifications.

Data on children's height (an indicator of long-run nutritional status) and weight (an indicator of short-run nutritional status) were used to test for the impact of pension income on children's health (table 5). Regressions were run separately for Black and Coloured children because of possible differences in growth patterns. The sample was restricted to children born after the old age pension system was fully implemented (January 1, 1994). A complete set of quarter-since-birth indicators was used to control for age.

For both Blacks and Coloureds the presence of a pensioner is positively and significantly correlated with children's height. The presence of one pensioner is associated with an additional 3 to 4 centimeters of height. On average Black and Coloured children were 8 centimeters taller with each year of age from ages zero to six, so the additional height associated with the presence of a pensioner is roughly that associated with an additional half year of age. For Blacks the presence of two pensioners has an effect on height more than twice that of one pensioner. (The were no young Coloured children in two-pensioner households.) The presence of a pensioner is also associated with increased weight (1 kilogram) for Coloured children, but is not a significant predictor of weight for Black children. That the pension is protective of children's height, and thus of their long-run nutritional status, may prove important in a country where many AIDS orphans will live with elderly relatives in the next decade.4

### Table 5. Children's Heights and Weights, Black and Coloured Children

<table>
<thead>
<tr>
<th>Control</th>
<th>Black</th>
<th>Coloured</th>
<th>Black</th>
<th>Coloured</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Height in centimeters</td>
<td>Weight in kilograms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Someone in household is eligible for a state pension</td>
<td>8.07</td>
<td>4.54</td>
<td>-0.055</td>
<td>1.10</td>
</tr>
<tr>
<td></td>
<td>(4.35)</td>
<td>(2.21)</td>
<td>(2.44)</td>
<td>(3.16)</td>
</tr>
<tr>
<td>One person in household is eligible for a state pension</td>
<td>3.21</td>
<td>1.54</td>
<td>0.074</td>
<td>1.10</td>
</tr>
<tr>
<td></td>
<td>(1.80)</td>
<td>(2.21)</td>
<td>(4.35)</td>
<td>(3.16)</td>
</tr>
<tr>
<td>Two or more people in household are eligible for a state pension</td>
<td>13.9</td>
<td>-1.10</td>
<td>2.67</td>
<td>2.65</td>
</tr>
<tr>
<td></td>
<td>(6.40)</td>
<td>(9.92)</td>
<td>(16.42)</td>
<td>(31.16)</td>
</tr>
<tr>
<td>Child is female</td>
<td>-7.83</td>
<td>-7.12</td>
<td>1.10</td>
<td>1.10</td>
</tr>
<tr>
<td></td>
<td>(2.87)</td>
<td>(2.57)</td>
<td>(1.34)</td>
<td>(1.34)</td>
</tr>
<tr>
<td>Number of observations</td>
<td>37</td>
<td>44</td>
<td>37</td>
<td>44</td>
</tr>
</tbody>
</table>

Note: The analysis uses the apartheid classification of "Black" and "Coloured," in part because the tables carry with them information about the long-term deprivation faced during the apartheid era. Sample is restricted to children born after January 1, 1994, when pension system was fully implemented. Numbers in parentheses are standard errors. All regressions include a complete set of quarter-since-birth indicators. Source: The Langenberg Survey 1998 [www.uct.ac.za/langenberg].

### Turning Money into Health

The results of the previous section provide evidence that pension income protects health status. What are some of the mechanisms by which money generates health? This section examines four potential channels: medical care, water and sanitation, nutrition, and psychosocial stress.

**THROUGH MEDICAL CARE.** One way in which money might generate health is through its effects on health care. Higher incomes may allow people to spend more time and money seeking out health services. A pensioner may be able to afford a consultation with a private doctor, for example, or a longer taxi ride to a better-equipped clinic.

Black and Coloured respondents were asked whether they had been to any of a number of health services for medical care in the previous three months—a day hospital or community clinic, mobile clinic, government hospital or outpatient clinic at a hospital, private hospital or clinic, private doctor, chemist shop, traditional healer, or community nurse who visits at home. Respondents' answers to a question on those services were regressed on an indicator of whether there was a pensioner in the household and whether the respondent was a pensioner, together with the respondent's age, an indicator that the respondent is Coloured, age interacted with the Coloured indicator, and indicators that the respondent is female and that the
respondent lives in an urban area. Neither having a pensioner in the household nor being a pensioner was a significant positive determinant of going to a clinic or doctor, whether government-run or private. (These results are available on request.)

Whether pensioners had an effect on choice of health care provider in pooling households was tested for by adding indicators that the household pools income and that the household has a pensioner and pools income. The coefficients for respondents living with pensioners in pooling households were never positive and significant determinants of health care use. (In fact, these respondents were significantly less likely to have been to a day clinic, a government hospital, or a private doctor.) The results for pensioners themselves were small and insignificantly different from zero. These results were robust to analyzing respondents by race and to restricting the sample to respondents who reported themselves to be in poor health.

There may be many reasons why no effects were found of pension income on health services. There were no controls for the quality of health care available, which may be uniformly poor. The three-month window may be too short to adequately capture health care use. Nonetheless, if income is protecting health status through the health care system, more work will be needed to find that out. The results of this analysis provide no evidence that pension income has a significant effect on doctor and clinic visits or that the protective effect of income on the health status of people living with pensioners comes through health services.

**THROUGH WATER AND SANITATION.** Another way in which money may influence health is through better sanitation. The pension may be used to upgrade household facilities, and some of the improvements may have health consequences. The presence of a pensioner in the household is positively and significantly correlated with a flush toilet in the dwelling and positively correlated with an indicator that the household has an on-site source of water (Cise 2001). Roughly 40 percent of the Black and Coloured households in the sample have a flush toilet; 90 percent have water on site. It may take time to obtain a flush toilet or water on site. These water-related variables are both significantly correlated with the number of years the pensioner should have been receiving a pension (based on age), together with an indicator that a pensioner is present in the household.

**THROUGH NUTRITION.** A third way in which money may influence health is through its effect on nutrition. Table 6 presents regression results on whether a knowledgeable household member reported that an adult in the household had skipped a meal or had the size of a meal reduced in the last year because of insufficient money to buy food. Roughly 45 percent of all Black and Coloured households reported an adult skipping a meal. The presence of one pensioner in the household on average reduced the probability of an adult skipping a meal by 20 percent. In pooling households the presence of two pensioners reduced the probability by 40 percent.

Skipping meals is associated with poorer health. In a pooling household in which an adult was reported to have skipped a meal, the health status of respondents was

<table>
<thead>
<tr>
<th>Table 6. Pension income, Income Pooling, and Hunger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household income pooled</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>Indicator: household</td>
</tr>
<tr>
<td>has a state pension</td>
</tr>
<tr>
<td>One person in</td>
</tr>
<tr>
<td>household is eligible</td>
</tr>
<tr>
<td>for a state pension</td>
</tr>
<tr>
<td>Two or more people</td>
</tr>
<tr>
<td>in household are</td>
</tr>
<tr>
<td>eligible for a</td>
</tr>
<tr>
<td>state pension</td>
</tr>
<tr>
<td>F-test: joint</td>
</tr>
<tr>
<td>significance of the</td>
</tr>
<tr>
<td>number of pensioner</td>
</tr>
<tr>
<td>variables</td>
</tr>
<tr>
<td>Household size:</td>
</tr>
<tr>
<td>not pool income</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td>Number of</td>
</tr>
<tr>
<td>observations</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Note: The analysis uses the apportioned classification of "Black" and "Coloured," in part because the labels carry with them information about the long-term deprivation faced during the apartheid era. Dependent variable is equal to 1 if a knowledgeable household member answered that "in the last 12 months (an adult) in the household ever cut the size of a meal or skipped meals because there wasn't enough money for food." This variable is a household-level variable, and the regressions include one observation per household. Numbers in parentheses are standard errors. All regressions are weighted based on the 1996 South African census, taking into account the stratification of the sample (by race) and the clustering of observations (by enumerator area).

In the Langeberg Survey all adults were asked a battery of questions about depression which is inextricably linked to stress. (As noted by Sapolsky [1994, p. 197], "it is impossible to understand either the biology or the psychology of major depressions without recognizing the critical role played in the disease by stress.") Respondents in the Langeberg Survey were asked how often in the past week they were miserable, depressed, sad, cried a lot, did not feel like eating, felt everything was an effort, slept restlessly, could not get going. For each behavior a response of "almost all the time" was coded as 1 and other answers as 0.

The responses for these behaviors were summed to create a depression index. (The mean index was 0.54, with 10 percent of the sample reporting two or more depression-related behaviors.) To test whether depression was correlated with income, the depression index was regressed on the presence of pensioners in the household (table 7). For households pooling income the presence of pensioners has a significant effect on reported depression. The greater was the number of pensioners, the greater this effect. (The results in table 7 are very similar if ordered probits are estimated in place of ordinary least squares regressions.) The presence of pensioners in nonpooling households is insignificant. Though the coefficient is larger, so is the standard error. When pooling and nonpooling households are combined, the presence of pensioners again has a large and significant effect on the depression index.

An alternative explanation for the benefits associated with the presence of a pensioner is simply that having older people in the household results in less depression for all household members. To test for this, controls were included in these regressions for household size, number of children, and number of members ages 55 and older. For pensioner households there was no significant effect of having older members unless those members were pension eligible.

Conclusion

The Langeberg Survey provides evidence that income has a causal effect on health status, an effect that works at least in part through sanitation and living standards, in part through nutritional status, and in part through the reduction of psychosocial stress.

The results demonstrate that information collected at the household level is not adequate to assess the causal effects of income on the well-being of individual household members. In the case of South Africa (and as seems likely to be true elsewhere), such data need to be augmented with additional information on household sharing rules, if accurate readings are to be taken.

The results also demonstrate that governments interested in improving health status may find cash benefits to be one of the most effective policy tools in their kit. Children dying of infectious diseases brought on by HIV/AIDS are often dying of the very same diseases that are killing children whose immune systems have been weakened by malnutrition. While adequate protocols have not yet been developed for treating children with HIV/AIDS, we know how to treat malnutrition—very simply, by providing income to the children's primary caregivers.

### Notes

1. This article uses the apartheid classification of "Black" and "Coloured," in part because the labels carry with them information about the long-term deprivation faced during the apartheid era. Numbers in parentheses are standard errors. The dependent variable is the depression index. Some of the responses to the question that "none of the time" the respondent was miserable, depressed, sad, cried a lot, did not feel like eating, felt everything was an effort, slept restlessly, could not get going, for each behavior a response of "almost all the time" was coded as 1, and all other answers as 0. All responses are weighted based on the 1996 South African census, taking into account the stratification of the sample by race and the clustering of observations (by enumerator area). Included in all regressions but not shown in the table are respondents' age, an indicator that respondent is a female, and an indicator that respondent is a male.

2. Surveys run in the United States to test the reliability of self-reported chronic conditions show a high degree of reliability. See Brownson and others (1994), for example, for reports on hypertension and diabetes.

3. In the National Health Interview Survey, total household income is recorded by income category (for 27 categories). Incomes have been assigned to each category using data from the 1986-95 March Current Population Surveys. See Case, Labotzky, and Paxson (2001) for details.

4. These findings are broadly consistent with those of Duflo (2000), who finds the South African pension protective of children's heights using data collected in 1993 (before the pension was fully implemented).
References


