

Wealthy and Healthy in the South Pacific

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Abstract

Objectives: The main aim of this paper is to analyse the relationship between socio-economic status and health status at the household level in Fiji, a developing country in the South Pacific, based on original household survey data compiled by the authors.

Method: We exploit the geographic conditions of Viti Levu, the relatively small main island of Fiji, to isolate the effects of household wealth on health. For households on this island physical distance is not a significant impediment for access to health care and other publicly-provided services. We use a constructed index of household wealth in place of the more commonly used income measure of socio-economic status. To control for reverse causality and other possible sources of endogeneity we use an Instrumental Variable strategy in the regression analysis.

Findings: We find that a household's socio-economic status, as measured by a constructed wealth index, has a substantial impact on the household's health status. We estimate that if a household's wealth increased from the minimum to the maximum level, this would decrease its probability of being afflicted by an incapacitating illness by almost 50 per cent.

Conclusions: Health outcomes from existing health services can therefore be improved by raising the economic well-being of poor households. Conversely, the provision of additional health services alone may not necessarily improve health outcomes for the poorest.

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INTRODUCTION

The positive association between socioeconomic status (SES) and health is well documented in industrialized countries (Pollack, *et al.* 2007; Marmot and Shipley, 1996; Mansyur, *et al.* (2008). Diverse SES indicators have been associated with a variety of health outcomes such as mortality (Marmot and Shipley, 1996; Mare, 1990), chronic conditions (Robert and House, 1996) functional status (Berkman and Gurland, 1998), mental health (Rodriguez, *et al.* 1999), and self-rated health status (Husiman *et al.*, 2003; Ostrove *et al.*, 1999). There is increasing evidence that SES indicators impact on health through different pathways (e.g. influencing exposure, susceptibility, physiological outcomes) and at distinct stages in the lifespan (Braveman *et al.*, 2005). Although income has been the most commonly used measure of economic well-being to investigate the SES-health relationship, wealth can be considered a superior measure as it can buffer the effects of income loss or short term income fluctuations (Pollack, *et al.*, 2007). Unlike measures of annual income or consumption, household wealth is less volatile and might therefore be a better indicator of ‘permanent income’ and longer-term welfare (Sahn and Stifel, 2000).

Although a small number of studies have examined the association between wealth and health in developing countries (Smith and Goldman, 2007; Zimmer, 2008) there is a dearth of reliable evidence of this association in the South Pacific region. Pacific island countries’ vulnerability to external shocks of an economic or environmental nature (Briguglio, 1995; Brown *et al.*, 2004) has prompted households to search for additional sources of income from abroad. As the international community pledged to spare no effort to eradicate extreme poverty and improve health indicators (UN, 2000), remittances sent by migrants to their countries of origin play a significant role in reducing poverty and “appear to be associated with increasing household investments in education, entrepreneurship, and health” (World Bank, 2006: ix).

Notwithstanding the above, one of the main challenges in examining the impact of SES on health-related variables is to disentangle the effects of geography (Meer, *et al.*, 2003). We have attempted to isolate the effects of geography and wealth by sampling from one, relatively small island in the South Pacific region. The geographic

conditions of Viti Levu, the main island of Fiji, allow for better isolation of the impact of wealth alone, given that for households on this small island, physical distance does not constitute a significant impediment for households' access to health care and other publicly-provided services.

Traditionally, economic indicators of welfare have been used in studies of the distribution of health outcomes, but potential endogeneity in the inter-relationships between these variables has hindered analysis of the causal effects of economic welfare on health (Ettner, 1996). A commonly-used econometrics strategy to address potential endogeneity is to use Instrumental Variable (IV) techniques. Using IV techniques Ettner examined the relationship between several measures of health, including self-assessed health status, and income in the U.S. She found that income had a large positive effect on mental and physical health. Similarly, Pritchett and Summers (1996) used IV estimates to examine the effect of cross-country income per capita on infant and child mortality and life expectancy. They found that increases in a country's income raises health status. However, as stated by Braveman *et al* (2005), "there are strong conceptual and empirical grounds for measuring wealth in health studies and for concluding that income is not an adequate measure of wealth" (p. 2883). In this paper, we apply IV techniques to household data from Viti Levu to examine the extent to which wealth (as measured by a constructed household wealth index) affects household health, using a self-reported measure of health status of household members.

METHODS

Sampling and Data Collection

Fiji, with a population of 836,000, comprises 322 islands, with the two main islands, Viti-Levu and Vanua Levu, home to over 94% of the population (World Bank, 2008). The survey was prepared and conducted in the first half of 2005. In total 420 households were interviewed, and with only two refusing to participate and four providing incomplete data the final sample consisted of 414 households. Information was collected for the household as well as for each individual within the household giving a total of 1,937 sampled individuals. The sample covered both urban and rural

enumeration areas, and included: the capital city, Suva; the five major towns of Nausori, Lautoka, Nadi, Ba and Sigatoka; and, nine villages and twelve settlements (Jimenez, 2008). There are two main ethnic groups, indigenous Fijians and Fijians of Indian origin (Indo-Fijians) each accounting for about half the total population, and, therefore also 50% of our sample.

Primary Sampling Units (enumeration areas, or PSUs) were randomly selected from the census listing and households within each enumeration area were also randomly drawn at a fixed rate. The survey respondent was the nominated household head and in their absence, their spouses or partners. All participants provided their free and informed consent. Ethical clearance was obtained from the Human Ethics Committee of the University of Queensland, Australia.

The primary focus of the questionnaire was on international migration and transfer income received through migrants' remittances. A customized migration, remittances and welfare household survey was developed following the layout used in the Life Standard Measurement Survey (LSMS) (Grosh and Munoz, 1996). A “cultural screening” of the questionnaire was undertaken with focus groups of Fijian migrants living in Australia, discussions with local teams of interviewers and pilot tests. All interviews were conducted in English, one of the official languages of Fiji, by a team of ten previously trained interviewers and one fieldwork supervisor. The average interview time was 50 minutes.

Measures

Although Fijian socio-cultural institutions encourage strong kinship and clan ties, the households are the basic social units with command over economic resources and responsibility for their members' welfare. Therefore, the household is the basic unit of analysis in this study. The survey instrument gathered general socio-demographic information about household members, including age, gender, ethnicity, education and employment status.

The questionnaire also collected information on 22 types of assets and housing characteristics. These included agricultural and non-agricultural land, buildings, and household consumer durables such as white-goods and vehicles. Characteristics of the

household's dwelling contained information about: number of rooms; floor, roof and wall materials; sources of water and lighting; and, type of toilet (Jimenez, 2008). Data on these assets and dwelling characteristics were used to construct a linear index to serve as a proxy for household wealth in the regression analysis. In constructing this index, Principal Components Analysis (PCA) (Joliffe, 2002) was applied, following Filmer and Pritchett (1999; 2001) and Sahn and Stifel (2000; 2003). The detailed results of the PCA and wealth index are available from the authors on request.

Since land ownership was not found to be positively correlated with ownership of other assets and as it affected the internal coherence and robustness of the wealth index, it was discarded as a component of the wealth index. This is not altogether surprising, when taking into account the land ownership regime in Fiji, affecting both the main ethnic groups. Indo-Fijians do not usually own land but lease land from Indigenous-Fijian landowners, whereas Indigenous-Fijians have access to land owned by kin-based land-owning groups (*mataqali*) (Prasad and Kumar, 2000). On the other hand, since our main focus of interest is household-level rather than the community-level wealth, we excluded those variables that are publicly-provided or dependent on the availability of infrastructure at the community level (Houweling, *et al.*, 2003)

In relation to health status, the survey collected information about the number of household members who were unable to perform their normal daily activities at any time during the previous 12 months, including working, studying or cooking, due to ill health. A self-reported measure of household health was then developed following one of the core Healthy Days Measures (Centers for Disease Control and Prevention, 2000). A household member was classified as affected by an incapacitating illness episode when unable to perform their daily activities for 30 days or longer over the preceding year. Of the 414 surveyed households, for 111 (26.8 per cent) at least one member had been incapacitated according to this definition.

Analytical methods

Measuring the impact of welfare variables, such as wealth, on health, implies complex methodological challenges. First, ideally we would have used an appropriate count data model for this analysis, such as the Poisson regression model, with the number of health incapacitated household members as the dependent variable. However the

limitations of our sample prevent this. Of the 414 households included in the sample, 303 (73.2%) reported no major illness, 93 (22.3%) reported one health incapacitated household member, 16 (3.8%) reported two, with the remaining two households (0.5%) reporting three incapacitated members. With so few observations with more than one incapacitated member it was necessary to transform the dependent variable into a binary variable, H with a value of one if at least one household member was incapacitated for 30 days or more, and equal to zero otherwise.

The following probit model was estimated:

$$P(H = 1) = \beta_0 + \beta_1 \hat{W} + \beta_2 X + \varepsilon,$$

where \hat{W} is the wealth variable and X is a vector of household variables, including ethnicity, location (capital city), household size, proportion of females, proportion of young adults, and education level of the household head. These socio-demographic characteristics and socio-economic factors have been found to generate different health effects across groups (Braveman, *et al.*, 2005).

Second, there is a very high likelihood of endogeneity bias in the hypothesized relationship, i.e. correlation between the dependent variable (health status) and the error term, for several reasons, including reverse causation and omitted variables (Wooldridge, 2002). For instance, healthier households might be more productive and therefore could accumulate more wealth. With endogeneity the standard regression coefficients are biased. They reflect both the net impact of the explanatory variable as well as the endogeneity bias. Without controlling for endogeneity, we cannot be sure that the estimated coefficient is indeed measuring the net effect of household wealth on health. For this reason, we use IV techniques when estimating the probit model.

The chosen instruments were two community-level variables constructed from the household sample. They measure mean wealth and mean per capita income in the community (PSU), omitting the household observation in each instance. We expect these variables to be correlated with household wealth, implying that households living in better-off communities are likely to enjoy higher levels of wealth. On the other hand, we do not expect community-level welfare variables to have a direct effect on whether or not household members were incapacitated for health reasons.

The appropriate statistical tests support both the strength and validity of the instruments. (First-Stage F-statistic = 99.26; Hansen J statistic = 0.493; p-value = 0.48).

RESULTS

The main socio-demographic characteristics of the households, for the whole sample and split by health status, including the variables used in the IV probit model are presented in Table 1. As expected, the average number of children, elderly and female household members are higher for households afflicted by an incapacitating illness. Similarly, the proportion of household heads with only primary education and living in rural areas or towns other than the capital city is also higher among those households.

Table 2 reports the IV probit regression estimates. The coefficient on the household wealth index has the expected sign and is significant at the 5% level. The estimated marginal effect indicates that a one unit increase in the household wealth index leads to a 5% decrease in the likelihood of the household being afflicted by a major illness. To gauge the magnitude of these effects we estimated the impact on health status of moving from the poorest to the richest household, holding all other variables constant at their mean values. The poorest household (wealth index = -4.61) has an estimated probability of a health-incapacitated member of 53%, while the richest household (wealth index = 4.53) has a probability of only 8%. To take the extreme case, if a household's wealth were to increase from the minimum to the maximum level, this would decrease its probability of being afflicted by an incapacitating illness by approximately 47%.

Regarding the other covariates, as expected, the size and gender composition of the household have significant effects on the probability of an incapacitating illness. However, the proportion of young adults does not appear to have a significant effect. Similarly, the education of the household head does not seem to impact on health status, independently of wealth and the other variables. However, the higher the

Table 1. Socio-demographic characteristics of study households by self-reported health measure (% in brackets)

Socio-demographic characteristics	All Households n=414 (100.0)	Households without major illness n=303 (73.2)	Households with major illness n=111 (26.8)
Household location			
<i>Capital City</i>	85 (20.5)	68 (22.4)	17 (15.3)
<i>Other</i>	329 (79.5)	235 (77.6)	94 (84.7)
Ethnicity			
<i>Indo-Fijian</i>	220 (53.1)	151 (49.8)	43 (38.7)
<i>Indigenous-Fijian</i>	194 (46.9)	152 (50.2)	68 (61.2)
Educational level of household head			
<i>Primary education</i>	62 (15.0)	42 (13.9)	20 (18.0)
<i>Secondary education</i>	293 (70.8)	214 (70.6)	79 (71.2)
<i>Post-secondary education</i>	59 (14.2)	47 (15.5)	12 (10.8)
Gender of household head			
<i>Male</i>	340 (82.1)	256 (84.5)	84 (75.7)
<i>Female</i>	74 (17.9)	47 (15.5)	27 (24.3)
Number of female household members			
<i>Mean ± SD</i>	2.3 ± 1.4	2.09 ± 1.2	3.0 ± 1.7
Number of male household members			
<i>Mean ± SD</i>	2.4 ± 1.5	2.27 ± 1.4	2.7 ± 1.6
Number of children (<14 yrs)			
<i>Mean ± SD</i>	1.2 ± 1.3	1.0 ± 1.2	1.6 ± 1.5
Number of young adults (≥ 14 ≤ 60 yrs)			
<i>Mean ± SD</i>	3.3 ± 1.7	3.2 ± 1.7	3.7 ± 1.9
Number of elderly (>60 yrs)			
<i>Mean ± SD</i>	0.2 ± 0.5	0.2 ± 0.43	0.4 ± 0.6

proportion of female members the higher the probability of an incapacitating illness. Male-only households have a predicted probability of an incapacitating illness of 11% versus 45% for female-only households.

Bearing in mind that potential endogeneity bias could also affect other household-level variables, such as education, location, household size and composition, an alternative IV probit model excluding all the covariates but ethnicity, was estimated to test the robustness of our findings. The results show that the effects of wealth are still

Table 2 Instrumental Variable (IV) probit regression estimates
(Dependent variable = Probability of household with health incapacitated member in last year)

	Coefficient	Robust Standard Error ^a	Marginal Effects
Household Wealth Index ^b	-0.162 ^c	(0.082)	-0.051
Household Size	0.160 ^d	(0.036)	0.051
Household location (Dummy Capital City)	0.050	(0.226)	0.016
Ethnicity (Dummy Indo-Fijian)	0.235	(0.203)	0.075
Proportion of Young Adults ^e	-0.525	(0.319)	-0.166
Proportion of Females	1.074 ^d	(0.305)	0.341
Household Head with Primary Education ^f	-0.104	(0.270)	-0.032
Household Head with Post-Secondary Education ^f	0.201	(0.212)	0.067
Constant	-2.230 ^d	(0.244)	
Wald Chi-Square (8) = 80.260			
Log pseudolikelihood = -11020.075			
Observations = 414			

^a Robust standard error clustered at the community level (26 clusters).

^b Wealth Index instrumented using average community wealth index and average community per capita income; excluded instruments-statistical tests: First-stage F-statistic (2, 25) = 99.26; Hansen J-statistic Chi-Square(1) = 0.493, p-value = 0.48

^c Significant at 5% level.

^d Significant at 1% level.

^e Proportion of household members between 14 and 60 years of age.

^f Omitted category is household head with secondary education.

positive and significant at the 5% level, and the estimated marginal effect is very similar (-4.7%).

Several limitations of this study need to be acknowledged. First, the questionnaire did not allow for the collection of detailed data about the health status of household members and therefore we cannot test the extent to which our results are robust to alternative measures of household health status. Second, taking into consideration the likelihood of complex interactions between health and other household variables, all the co-variates included in the model, except ethnicity, could also suffer from potential endogeneity bias, especially given that we are dependent on a single, cross-sectional sample. Due caution should therefore be exercised in interpreting the results, bearing in mind however, that when we re-estimated the model excluding all

potentially endogenous variables, the coefficient on the wealth variable remained statistically significant and its marginal effect was substantially similar, providing support for the robustness of our main findings.

CONCLUDING DISCUSSION

The results of this study, identifying a strong, statistically significant relationship between a household's socio-economic status and its health status are important in a number of respects, in terms of both analytical method and policy implications. First, although there have been a number of studies examining the relationship between socio-economic status and wealth, there are relatively few studies from developing countries, and there are no other such studies from the Pacific island region. Second, to our knowledge no previous study has employed an appropriate strategy to control for possible reverse causality and other sources of endogeneity, in analysing the relationship between wealth and health. This is the first such study to employ instrumental variable techniques to control for endogeneity. Third, this study differs from others in terms of the level at which health effects are analysed. We use a household-level measure of health status constructed from our survey sample, in contrast to previous studies that use either individual (Zimmer, 2008; Meer *et al.*, 2003; Ettner, 1996) or aggregate population-level health measures (Pritchett and Summers, 1996)). Given that the household is regarded as the appropriate unit of analysis in most studies of socio-economic well-being, including health status, it is important that our findings reinforce those based on both highly aggregated and individual-level data. Fourth, most previous studies have been unable to separate the effects of geography from socio-economic status. By restricting our sample to one, relatively small island in the South Pacific, our results are less likely to be affected by geographic factors, especially physical distance to and accessibility of health care and other health-related facilities. Fifth, from a policy perspective our findings are consistent with previous research indicating that effective poverty alleviation policies and programs, such as safer public housing or adequate school nutrition programs, play a critical role in improving health outcomes from existing levels of healthcare services (Adler, *et al.*, 1993; Marmot, *et al.*, 1997). Conversely, these findings also

suggest that the provision of additional health care services alone may not necessarily improve health outcomes for the poorest.

In the specific context of Pacific island nations, with their extremely small populations and domestic markets, afflicted by the tyranny of distance, inadequate and costly transportation and communications infrastructure, and vulnerable to highly volatile external economic or environmental factors, there are severe constraints within their domestic economies on effective poverty-alleviating interventions and wealth accumulation. As noted previously, many of these countries have, as a consequence, become highly dependent on external resource flows, mainly in the form of foreign aid and remittances from their international migrants. Recent research has found that migrants' remittances contribute substantially to the alleviation of poverty and to poor households' capacity to accumulate wealth (Jimenez, 2008). If, as the findings of this study indicate, household material wealth has a positive impact on household health status, there is an even stronger case for the two major migrant destination countries in the region, Australia and New Zealand, to combine their poverty alleviation-focused aid programs with the provision of more migration opportunities targeted specifically at unskilled labor from the Pacific islands, such as the pilot 'guest worker' schemes both have recently adopted.

References

- Adler, N.E., Boyce, W.T., Chesney, M.A., Folkman, S., and Syme S.L. (1993) Socioeconomic inequalities in health: No easy solution. *Journal of the American Medical Association*, 269:3140-5.
- Berkman, C.S., and Gurland, B.J. (1998) The relationship among income, other socioeconomic indicators, and functional level in older persons. *Journal of Aging and Health*, 10:81-98.
- Braveman, P.A., Cubbin, C., Egerter, S., Chideya, S., Marchi, K.S., Metzler, M. *et al.* Socioeconomic status in health research: one size does not fit all. *Journal of the American Medical Association*. 2005;294(22):2879-88.
- Briguglio L. (1995) Small island developing states and their economic vulnerabilities. *World Development*, 23(9):1615-32.
- Brown, R., Headey, D., and Leeves, G. (2004) Macroeconomic volatility in the Pacific. Sydney: World Bank.
- Centers for Disease Control and Prevention (2000). Measuring Healthy Days. Atlanta, Georgia: CDC.
- Ettner, S.L. (1996) New evidence on the relationship between income and health. *Journal of Health Economics*, 15:67-85.
- Filmer, D. and Pritchett, L. (2001) Estimating wealth effects without expenditure data--or tears: An application to educational enrollments in states of India. *Demography*, 38(1):115-32.
- Filmer, D, and Pritchett, L. (1999) The effect of household wealth on educational attainment: Evidence from 35 countries. *Population and Development Review*, 24(1):85-120.
- UN (2000) *Millennium Declaration*. General Assembly United Nations, Geneva: UN.
- Grosh, M. and Muñoz, J. (1996) *A manual for planning and implementing the Living Standards Measurement Study Survey*. Washington: World Bank.
- Houweling, T.A., Kunst, A.E., and Mackenbach, J.P. (2003) Measuring health inequality among children in developing countries: does the choice of the indicator of economic status matter? *International Journal for Equity in Health* BMC. (2):8.
- Huisman, M.A., Kunst, J., and Mackenbach, .JP. (2003) Socioeconomic inequalities in morbidity among the elderly: A European overview. *Social Science & Medicine*, 57:861-73.
- Jimenez Soto, E.V. (2008) *The social protection role of remittances - The cases of Fiji and Tonga*. Brisbane: University of Queensland.
- Jolliffe, I.T. (2002) *Principal Component Analysis*. 2nd ed. New York: Springer.
- Mansyur, C., Amick, B.C., Harrist, R.B., Franzini, L. (2008) Social capital, income inequality, and self-rated health in 45 countries. *Social Science & Medicine*. 66:43-56.
- Mare, R.D. (1990) Socio-economic careers and differential mortality among older men in the United States. In: Vallin J, D'Souza S, and Palloni A, (eds) *Measurement and analysis of mortality: new approaches*. New York: Oxford University Press.
- Marmot, M.G., Ryff, C.D., Bumpass, L.L., Shipley, M., and Marks, N.F. (1997) Social inequalities in health: Next questions and convergent evidence. *Social Science & Medicine*, 44:901-10.

- Marmot, M.G., and Shipley, M.J. (1996) Do socioeconomic differences in mortality persist after retirement? 25 year follow up of civil servants from the first Whitehall study. *British Medical Journal*, 313:1177-80.
- Meer, J., Miller, D.L., and Rosen, H.S. (2003) Exploring the health-wealth nexus. *Journal of Health Economics*, 22:713-30.
- Mulholland, E.K., Smith, L., Carneiro, I., Becher, H., and Lehmann, D. (2008) Equity and child-survival strategies. *Bulletin of the World Health Organization*, 86:399-407.
- Ostrove, J.M., Feldman, P., and Adler, N.E. (1999) Relationship among socioeconomic status indicators and health for African-Americans and whites. *Journal of Health Psychology*, 4:451-63.
- Pollack, C.E., Chideya, S., Cubbin, C., Williams, B., Dekker, M., and Braveman, P. (2007) Should health studies measure wealth? A systematic review. *American Journal of Preventive Medicine*, 33(3):250-64.
- Prasad, B., and Kumar, T. (2000) Institutional rigidities and economic performance in Fiji. In: Akram-Lodhi AH, (ed.) *Confronting Fiji Futures*. Canberra: Asia Pacific Press, ANU, pp.111-32.
- Pritchett, L., and Summers, L.H. (1996) Wealthier is healthier. *Journal of Human Resources*, 31(4):841-68.
- Robert, S., and House, J.S. (1996) SES differentials in health by age and alternative indicators of SES. *Journal of Aging and Health*, 8:359-88.
- Rodriguez, E., Allen, J.A., Frongillo, E.A., and Chandra, P. (1999) Unemployment, depression and health: a look at the African-American community. *Journal of Epidemiology and Community Health*, 53:335-42.
- Sahn, D., and Stifel, D. (2003) Exploring alternative measures of welfare in the absence of expenditure data. *Review of Income and Wealth*, 49(4):463-90.
- Sahn, D., and Stifel, D. (2000) Poverty comparisons over time and across countries in Africa. *World Development*, 28(12):2123-55.
- Smith, K.V., and Goldman, N. (2007) Socioeconomic differences in health among older adults in Mexico. *Social Science & Medicine*, 65:1372-85.
- Wooldridge, J. (2002) *Econometric analysis of cross section and panel data*. London: MIT Press.
- World Bank (2006) *Global Economic Prospects 2006: Economic implications of remittances and migration*. Washington: World Bank.
- World Bank (2008) *Migration and Remittances Factbook 2008 - Developing countries*: World Bank.
- Zimmer, Z. (2008) Poverty, wealth inequality and health among older adults in rural Cambodia. *Social Science & Medicine*, 66:57-71.