

**Social Grants, Welfare and the Incentive to Trade-Off Health for Income among  
Individuals on HAART in South Africa**

Running Header: Social Grants, Welfare and Health

*Atheendar S. Venkataramani<sup>1</sup>, Brendan Maughan-Brown<sup>2</sup>, Nicoli Nattrass<sup>2</sup>, Jennifer Prabh Ruger<sup>1</sup>*

<sup>1</sup>Division of Health Policy and Administration, Yale University School of Public Health,

<sup>2</sup>AIDS and Society Research Unit, University of Cape Town

*Correspondence and Reprints to:* A. Venkataramani, 60 College St/ P.O. Box 208034 /New Haven, CT 06520 USA; e-mail: [atheendar.venkataramani@yale.edu](mailto:atheendar.venkataramani@yale.edu); ph: (+1) 518 859 0995

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**ABSTRACT**

**Background:** A growing body of qualitative research suggests that poor South Africans living with HIV/AIDS may be compelled to trade-off their health in order to remain eligible

to receive state grants given to those too sick to work. We used quantitative methods to evaluate the extent to which disability grants promoted individual and household welfare and, consequently, the impacts of grant loss, among persons living with HIV/AIDS in South Africa. We then assessed whether individuals forewent/modulated their treatment in order to retain/regain access to grants.

**Methods and Findings:** Using data from a unique three-year panel study of individuals on HAART from Khayelitsha, a large township of Cape Town, we used individual fixed effects models to assess the impacts of disability grant receipt/termination on indicators of individual and household welfare such as self-reported health status, adherence to treatment, individual and household incomes, and employment status. We then used a variety of strategies to further assess whether individuals traded off health for income, including tracking the health trajectories of poorer individuals who *a priori* might be most susceptible to reacting to perverse incentives introduced by the disability grant system. We found that disability grant loss was associated with substantial declines in individual and household incomes, especially among those people who could not find employment thereafter. However, we found no evidence of a relationship between grant loss and self-reported health or adherence, and respondents did not appear to take frequent breaks from treatment in order to remain eligible for grants.

**Conclusion:** While individuals and households experienced significant drops in income due to grant loss, they experienced no fall in health status and appeared unwilling to trade-off their health for income.

## **KEYWORDS**

Adherence, AIDS, Antiretroviral Therapy, Incentives, Social Security, South Africa



## INTRODUCTION

HIV/AIDS is an important public health and policy issue in South Africa. Recent estimates suggest that nearly 20% of all adults aged 20-64 in the country are infected with this disease [1]. Policies to address the adverse health and socioeconomic consequences of HIV/AIDS in South Africa include public sector provision of highly active antiretroviral therapy (HAART) and the disability grant, a cash transfer program targeting individuals who are deemed too sick or incapacitated to work and who meet an income-based means test [2].

The disability grant is a small but growing component of South Africa's relatively generous and well-developed social security system. The number of individuals receiving disability grants has more than doubled since 2000, rising to 1.4 million recipients in 2008, with much of this growth attributable to increases in the number of AIDS-sick people [3-7]. Government grants in general, and the disability grant and old age pension in particular (the two largest transfers), are highly redistributive. Poor households with access to such grants are significantly better off than comparable households without pensioners or disability grantees [5, 8-16].

Disability grants are awarded either on a 'temporary' basis (payments are provided up to one year, whereupon the individual has to reapply for further benefits) or on a 'permanent' basis (requiring renewal every five years); a letter from a physician is used to confirm that the applicant is indeed too sick to work and the necessary time frame over which the grant is to be awarded[2]. People lose eligibility once they become healthy enough to re-enter the labor force. However, because of high rates of unemployment, particularly among black South Africans, the loss of a disability grant is not necessarily followed by a shift into employment. Indeed, many people who lose their grants may find themselves

trapped in a state of unemployment, with serious consequences for individual and household welfare.

For individuals who are AIDS-sick, those receiving treatment generally have their health restored within six months [17-19]. These individuals should lose their disability grants as they are no longer too sick to work. However, if the person is unable to find work after the disability grant has been terminated, and if they cannot borrow from formal institutions or extended family/social networks, they may find their health threatened once again – most obviously by poor nutrition (which undermines the person's immune system and reduces the effectiveness of HAART).

Consequently, policymakers and researchers are concerned that individuals on HAART may have to choose between adhering to treatment and losing the disability grant, or defaulting on treatment in order to get sick enough to have the grant renewed [5, 6, 12, 14, 15]. That is, the disability grant system may create perverse incentives for individuals living with HIV/AIDS to forego treatment in order to maintain their income. Given that the number of people losing their disability grants per year is likely to rise to about half a million by 2010 [6], this potential trade-off could have serious social implications and may contribute to the development of resistance to HAART [20]. The aim of this study is to quantitatively assess, for the first time, the impacts of disability grant receipt on individual and household welfare (i.e., establish whether the hypothesized perverse incentives are salient) and whether the possibility of grant loss or grant loss itself drives individuals to trade off their health for additional income, using a unique longitudinal dataset of individuals on HAART.

## METHODS

### *Setting and Data*

Data used in this study were collected in Khayelitsha, a large black township of over 500,000 people situated southeast of central Cape Town. Khayelitsha is an overcrowded mix of formal housing and informal (shack type) houses, but most residents are poor and live in corrugated iron shacks without running water. Unemployment rates in the area are around 51% [21]. Antenatal clinic data indicate an HIV prevalence of 33% [22].

In 2004/2005 the AIDS and Society Research Unit (ASRU) at the University of Cape Town initiated the HAART Panel Study to investigate the impact of long-term HAART on the lives of people living with AIDS. The study aimed to recruit as many people who had participated in the pilot HAART roll-out program conducted in Khayelitsha by Médecins Sans Frontières (MSF) in collaboration with the Western Cape Provincial government. This program, the first public provision of HAART in Africa, started in May 2001 and, by 2004, more than a thousand Khayelitsha residents had commenced treatment [23-25].

Because of patient confidentiality issues, there was no sample frame upon which to draw a representative random sample. Consequently, a (purposive) snowball sample of 242 individuals who had been on HAART for at least a year was recruited through social networks via word of mouth and contacts with clinics and support groups. Over two thirds of those who joined the MSF pilot HAART project in 2001 were recruited into the study, as were over a third of the total known cohort of people in Khayelitsha who had been on HAART for longer than a year. The sample was re-interviewed in early 2006 and late 2007.

The HAART Panel sample is suitable for the purposes of this study for three reasons. First, Khayelitsha is a relatively poor area and, consequently, the majority of the

sample would be eligible for the disability grant. Second, Khayelitsha is known to afford residents relatively easy access to social welfare organizations. Thus, a high proportion of eligible adults in Khayelitsha can be expected to be accessing disability grants. Third, as HAART has restored many of the participants' health it is likely that disability grant loss would be reported during the three-year study period.

For our analysis, we used data on individual and household incomes (inclusive of all wages, profits, remittances and grants) and a binary measure of employment in the month preceding the interview as indicators of economic status. Specific measures of health used were self-reported health status (1 – 5 Likert scale, with 1 being poor and 5 being excellent health) and side effects experienced (a scale from 0 – 12, reflecting the number of different types of side effects). We considered side effects as these may reflect reduced efficacy of HAART in conditions where nutritional intake is compromised due to loss of income. We also utilized two measures of adherence to treatment: a 1 – 10 Likert scale, with 10 being perfect adherence, and a binary measure from the 2007 wave indicating whether the individual would hypothetically forego treatment to continue receiving disability grants

### *Empirical Analysis*

We began by examining trends in adherence to treatment, health, economic status and disability grant receipt, by calculating descriptive statistics for the individual and household welfare outcomes for each of the three survey waves. These statistics were computed for the entire sample and separately by those receiving disability grants in order to differences in grant recipients and non-recipients and to assess the potential impacts of grant loss. We also followed health and economic status over time for those individuals who lost disability grants between the first and second rounds of the survey by subsequent

employment status to assess whether the impact of grant loss varied by whether or not an individual could find work.

Individual fixed effects regressions were then used to examine impacts of grant receipt/termination on individual and household welfare. Specifically, disability grant receipt was used as the main independent variable, with adherence to treatment, health (self-reported health status and side effects), employment, income, and household demographic characteristics (household size, number of pensioners, and number of children) as dependent variables. We included the demographic variables as previous research has shown them to be responsive to social welfare transfers [16]. All specifications included binary indicators for survey wave, and interactions between survey wave and age, education, length of time since commencing HAART, and gender to account for differential time trends that may influence both disability grant receipt and the outcomes of influence.

We used individual fixed effects in order to control for time invariant unobservable characteristics that may be jointly correlated with disability grant receipt and individual and household welfare outcomes. For example, those who receive grants may be worse off/poorer than those who do not, thus leading to underestimates of the impact of grant loss. The bias may work in the opposite direction as well: those who receive grants may be better able to navigate the social security system using skills that are also beneficial in gaining employment and sustaining health. Fixed effects would account for both types of bias.

However, several issues arise with the use of fixed effects regressions. For example, such models would be prone to bias from reverse causality. In our case, because grants are allocated based on health status, estimates from fixed effects models may reflect the effect of changes in health on grant status rather than the other way around. More generally, fixed effects models do not account for time-varying characteristics, such as unobserved changes

in family circumstances, which may influence both grant receipt and individual and household health outcomes. To address this issue, we compared the fixed effects coefficients to those gleaned from instrumental variable models, where we used reported grant renewal prior to the first survey wave as an instrument for grant receipt status. We contend that grant renewals are correlated with the type of grant that the individual may have initially received ('permanent grants' would not require renewal, whereas 'temporary' grants would), and therefore also with the likelihood of having a grant at any given time. Qualitative evidence suggests that doctors vary greatly in how stringently they follow disability grant laws and with regard to their propensities for prescribing 'temporary' or 'permanent' grants [26]. Thus, conditional on individual fixed effects, the type of disability grant an individual initially received may essentially be random<sup>1</sup>. Under these assumptions, grant renewal would be an ideal instrumental variable in that it would predict who loses grants but would not affect (changes in) adherence, health and socioeconomic status directly. Put differently, with the use of this instrument, we can be confident that grant loss is not (reverse) caused by any of our outcome variables or by unobserved time varying characteristics

The fixed effects approach, while useful in helping determine the impacts of grant loss, may not necessarily provide information on people's behavioral responses to the potential of grant loss. For example, if individuals forego or modulate their treatment regimen just before their grant comes up for renewal in order to remain on disability grants, not only would the estimates of the impact of grant loss on health be downward biased, but the empirical model would not necessarily capture this nuanced dynamic behavior.

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<sup>1</sup> This assumption might be too strong if individuals may have initially bribed doctors to get temporary or permanent grants. However, if the propensity or ability to bribe officials remains fixed over time, then this possibility would be addressed by the individual specific fixed-effect.

We adopted several different strategies to further address this issue. First, we utilized information from questions directly asking individuals whether they would be willing to forego treatment in order to remain on disability grants and their level of adherence to treatment between survey waves. Second, since response patterns to these questions may reflect social desirability bias, we followed self-reported health and side effects over time for groups of individuals *a priori* deemed most likely to respond to perverse incentives. Recent evidence suggests that frequent (structured) breaks from treatment may lead to poorer health and an increased risk of complications [27]. From this it seems reasonable to suggest that intermittent breaks from treatment uninformed by clinical parameters may be as bad or worse for one's health. As such, if individuals were actually foregoing treatment from time to time in order to stay eligible to receive grants, we would expect to see worsening self-reported health and side-effect profiles over time. Thus, our strategy compared the health trajectories of those individuals who reported having had to renew their grant prior to 2004 and/or those individuals in the bottom quartile of the baseline income distribution and see if their health status worsens over time relative to their better off counterparts. We chose the group of renewers because, as mentioned earlier, these individuals were likely on temporary grants and thus actually stood to lose the transfers during the study period. Poorer individuals were chosen because it is likely that these individuals were most reliant on grant income for consumption. The specific model we used to assess differential trends included the interaction between a binary indicator for being in a "vulnerable" group at baseline and survey year and individual fixed effects; the dependent variable was either self-reported health or the number of reported side effects.

Finally, we investigated possible biases due to attrition across the survey waves. We used regression techniques to model the probability of leaving the panel study as a function

of age, gender, level of education, employment status, household income, household size, disability grant receipt and self-reported health at baseline. If attrition was due to death, an outcome that is perhaps more likely for those who do not adhere to treatment, then the relationships between grant receipt and/or poverty and attrition may provide additional insight into whether individual's trade-off their health for income.

## RESULTS

Sample characteristics, calculated from the first wave of the survey, are presented in *Table 1*. We also present sample statistics from baseline data collected from the concurrent Khayeltisha Panel Study (KPS). The latter study represents a random sample of the township population and serves as a useful benchmark to assess whether empirical results from the HAART sample can be generalized.

In the HAART sample, the vast majority of respondents (79%) were women; the difference between the HAART and KPS in this regard is statistically significant.<sup>2</sup> The mean age in the HAART Panel Study was 34 years, and most individuals had completed an average of 9.5 years of schooling, which mirrors the results found in the general population survey. Baseline income levels across the two surveys were similar, as well, though individuals in the KPS were significantly more likely to hold employment. Also, individuals in the KPS reported having better self-reported health than their counterparts in the HAART survey. Finally, most relevant to the present study, 74% of respondents in the HAART sample reported receiving a disability grant.

Despite similarities across many baseline sociodemographic studies, one issue with

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<sup>2</sup> This reflects the fact that women are more vulnerable to HIV than men (so one would expect more women than men to be AIDS-sick) and that men are less likely than women to participate in HAART programs, and seek medical treatment more generally [27].

using a selected sample of early adopters of HAART is that they may have been more health-conscious and more likely to adhere to treatment than the average individual. To address this possibility, we also looked at differences in (potentially) risky sexual behaviors. While we found that individuals in the HAART sample are significantly less likely to report always using a condom, this proportion is still not zero. Furthermore, there was no cross sample difference in the proportion of individuals reporting concurrent sexual partnerships.

*Table 2* presents means for household and individual income, self-reported health and number of side effects, and the proportions of individuals employed, by sample year and by receipt of disability grant. Importantly, all individuals reported perfect or near perfect adherence (9 or 10 out of 10 on the Likert scale) across all three survey waves. In addition, not a single individual indicated that they would “stop taking ARVs” to “get (back) [their] disability grant.”<sup>3</sup> We do not report these results in the table given the lack of variation in adherence behaviors.

*Table 2* highlights three main points. First, not surprisingly, disability grant receipt appeared to be strongly associated with individual and household income. Among disability grant recipients, grant income constituted the majority of individual income (almost two thirds in 2004/5 and 2006, and 56% in 2007) and about 40% of household income. Second, disability grant receipt did not appear to be associated with health outcomes, as self-reported health and side effects reported were very similar across those with and without grants. Third, the disability grant system did not appear to have operated as intended: the majority of the individuals receiving disability grants reported being in good or excellent health and nearly a third of all grant recipients in the sample were employed in 2004/5 and 2006 (43%

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<sup>3</sup> It should be noted, however, that 10% of respondents in 2007 agreed that “it is a common strategy for HIV-infected people who have lost their disability grant to become sick again to get the grant back.”

of grant recipients were working in 2007).<sup>4</sup> In addition, of the 42 individuals who started receiving disability grants before 2002, exactly half continued to report receipt in 2007 (not shown here). Even under the assumption that these individuals were issued permanent (five-year) grants, all of these grants should have been terminated by the final survey wave.

*Table 3* explores the potential negative effects of grant loss on health and income by following individuals whose disability grant was terminated (and not renewed) between the first two survey waves. On average, an individual who lost a disability grant reported significantly lower personal income in 2006, though this appears to have rebounded slightly in 2007 (see first panel of table). Household income showed a similar pattern, though the declines were smaller in relative and absolute terms. This suggests the presence of coping mechanisms among households, extended families and social networks that helped smooth income in response to the loss of grants. However, our results also suggest that these coping mechanisms may have been incomplete: household income fell substantially and had not recovered more than two years after the loss of the disability grant. The adverse effects of this drop in income would be accentuated if consumption smoothing mechanisms are limited, as is likely among this poor sample.

For individuals losing disability grants who were unable to find employment (see second panel of *Table 3*), the situation was more dire: personal income dropped by over 95% and household income fell by nearly 50%. While these individuals reported increases in all measures of income in the final survey round, the turnaround was small in comparison to the initial decline. In addition, unemployed individuals reported being in slightly worse health and a greater number of side effects from HAART immediately after losing their

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<sup>4</sup> Not only did individuals continue to receive grants after commencing employment, but several individuals actually started receiving grants while being engaged in steady wage or self-employment over the previous year (not shown here).

grants, though these outcomes rebounded in the final survey wave.

Results for fixed effects models evaluating the potential effects of disability grants on various measures of individual and household welfare are presented in *Table 4*. To reduce clutter, we only report coefficients on the disability grant variable. The first panel of the table illustrates results for logged income (individual and household) and employment. The estimates suggest that losing a disability grant was associated with a 74% decrease in personal income (coefficient/[coefficient + 1]). The results for household income suggest a similar pattern, though the percentage decreases are much smaller (43%). As mentioned previously, this could reflect the effect of consumption and income smoothing mechanisms among families and other social networks. We found no association between disability grant status and employment status.

In the second panel of *Table 4* we present results for self-reported health and side effects from treatment. We found no statistically significant association between disability grant receipt and the health status indicators. The findings in this panel, as well as those presented in the first panel, are consistent with those gleaned from *Tables 2* and *3*.

Finally, the third panel of *Table 4* illustrates the association between disability grant receipt and household demographics. We found a strong positive association between grant status and the number of children under the age of 10. We found no statistically significant associations between total household size or the number of pension eligible elderly living in the household and disability grant status. Collectively, these findings suggest that the share of dependents in the household decreased in response to disability grant loss, which is consistent with the literature on the South African Old Age Pension [16].

The IV results (see *Appendix Table 1*) were similar in magnitude and sign, though less precisely estimated, as compared to the results in *Table 4*. Furthermore, we tested the

sensitivity of the fixed effects results to the exclusion of the age, gender and education specific trends and found the results to be robust (not shown here). Both pieces of evidence suggest that the fixed effects estimates on disability grant receipt were not biased by other time-varying factors that might have jointly influenced grant receipt and individual and household welfare, thus confounding the relationship between the two.

*Table 5* presents results for fixed effects models comparing the health trajectories of population groups who were *a priori* deemed more likely to respond to perverse incentives generated by the grant program to those their better off counterparts. Using those who had to renew their grants as our group of vulnerable individuals, we found no downward (upward) trend in self-reported health (side effects) in models with or without additional controls: in fact the point estimates imply that renewers became slightly better off in terms of these health indicators than their counterparts. While the standard errors on these coefficients were large, the 95% confidence intervals did rule out meaningful adverse trends. The trend estimates for those in the bottom quintile of the baseline income distribution were even less impressive than those estimated for baseline grant renewers and were often “wrong signed,” as well, though in the case of self-reported health the 95% confidence bands did not rule out substantively important trends towards poorer health. These results, in conjunction with those from the fixed effects models and the fact that not a single respondent reported that they would consider trading-off income for health, suggest that individuals did not respond to perverse incentives in grant loss during the study period.

Finally, none of the baseline characteristics (health, income, side effects, disability grant receipt, age, and education level) were significant predictors of survey attrition (not shown here). This suggests that the estimates in *Tables 4* and *5* were not biased by poorer, sicker individuals leaving the survey.

## DISCUSSION

The disability grant program is an important part of South African policy towards persons living with AIDS. Individuals who become AIDS-sick are eligible to receive this large transfer payment, which is intended to support them until they become well enough to work. However, upon grant termination, many individuals may be unable to find work due to high levels of unemployment, which could create perverse incentives to forego treatment in order to stay sick enough to remain eligible for grant payments.

The aim of our study was to examine (1) whether the loss of disability grants had measures of individual and household welfare, such as income and self-reported health, and (2) whether individuals responded to potential perverse incentives created by the grant program by forgoing or interrupting treatment. Using data from a panel survey of individuals on HAART in Khayelitsha, South Africa, our core findings were that disability grant receipt (termination) was highly associated with higher (lower) personal and household incomes. However, there was no association between grant receipt and health and the results of a variety of different empirical tests consistently suggested that individuals did not interrupt treatment in order to become/remain eligible for grants. Put differently, our results with respect to adherence and health do not support qualitative and anecdotal evidence that individuals forego or modify treatment in order to continue receiving disability grant

transfers. This is despite the fact that individuals who lost grants, especially those who were not employed, experienced large decreases in their own and their household's income.

The discrepancy in the findings regarding adherence/health and income may be explained by households compensating for the loss of a disability grant in ways that do not require one to sacrifice their health. For example, as our results indicated, one such compensation mechanism was altering household composition. Along these lines, our findings that the disability grant system did not work as intended – individuals who *a priori* should have been ineligible for grants continued to receive them - suggests that individuals may have had ample opportunities to game the system, which may have precluded the need to forego treatment. Finally, individuals may not have been willing to trade-off their health under any circumstances, as the disutility from becoming AIDS-sick again far outweighs the loss of income or consumption. Each of these points warrants further research attention.

The discrepancy between our results and the qualitative evidence may perhaps also be explained by differences in sampling. It is possible that the individuals who self-selected into the HAART Panel Study, who were recruited through social networks, were more vigilant about maintaining their health the average person living in Khayelitsha. Thus, our sample may exclude those people who would be most likely to forego treatment for income. However, as shown in *Table 1*, the respondents in the HAART sample were similar to a random sample of those in the general population on a number of important characteristics, including educational attainment and income. With regards to greater vigilance over one's health specifically, the high level of concurrent sexual partnerships and risky sexual behaviors in the HAART sample suggest that non-representativeness with respect to these characteristics may not compromise the generalizability of the results entirely.

There are several other limitations in our study, as well. First, our strategies to explore

whether individuals respond to perverse incentives are indirect. While we are able to show in a variety of tests that the bulk of the evidence points towards finding that individuals do not trade-off income for health, future research would do well to procure more direct evidence. Second, self-reported measures for adherence and, to a lesser extent, health may be prone to reporting biases. Future research should seek to use objective indicators, such as viral loads or CD4+ counts. On this point, we did use some self-reported information on CD4+ counts and the results conformed very well to the findings presented in the previous section. However, self-reported counts are only available for about 60% of the sample, and the number of reported counts varies greatly across individuals. Thus, we did not highlight these results due to worries about recall bias and sample selection.

In terms of policy implications, while our results suggest that individuals on HAART do not forego treatment to remain on disability grants, there still appears to be a large financial burden associated with grant loss. Future research should examine alternative social welfare programs for AIDS-sick individuals that do not assume that individuals can find work after they stop receiving transfers or provide means to better smooth consumption and income over time. This would help mitigate any negative welfare costs of losing a social grant as well as reduce any incentive to engage in potentially harmful behaviors to continue receiving transfers.

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## TABLES

**Table 1. Baseline characteristics for HAART Panel Study.**

	HAART (n = 242)		KPS (n = 571)	
	Mean	Std. Dev	Mean	Std. Dev
Disability Grant (= 1)*	0.74	0.44	0.08	0.27
Gender (female = 1)*	0.79	0.41	0.59	0.49
Age (years)	33.95	7.22	38.49	12.22
Education				
None	0.02	0.14	0.03	0.16
Primary	0.12	0.32	0.17	0.38
Secondary	0.54	0.50	0.53	0.50
Grade 12/Matric	0.33	0.47	0.27	0.49
Baseline Household Income (\$US/month)	294.87	194.53	321.65	284.12
Self-Reported (1-5 Likert Scale, 5 – excellent health)	3.71	1.13	4.07	1.11

Employment (= 1)*	0.35	0.49	0.53	0.50
Do Not Use Condoms All the Time (= 1)*	0.19	0.09	0.77	0.12
Concurrent Sexual Partnership (=1)	0.20	0.40	0.18	0.38

-Notes: HAART refers to the HAART Panel Study and KPS the Khayelitsha Panel Study

\* - refers to a statistically significant difference in proportions across the two samples

**Table 2. Descriptive statistics for employment, health and income by year and disability grant receipt.**

	2004/05	2006	2007
<b>Complete Sample:</b>			
Sample size	242	224	216
Disability grant recipients (%)	74	46	42
Employment (% working in month preceding interview)	34	42	52
Average individual income (\$ US/month)	162	150	171
Average household income (\$ US/month)	295	269	315
Per capita household income (\$ US/month)	91	79	108
Self-reported health (1-5 scale, 5 – excellent)	3.71	3.58	3.91
Side effects (number experienced)	2.60	3.15	2.14
<b>Disability grant recipients:</b>			
Sample size	178	104	90

Employment (% working in month preceding interview)	30	32	43
Average individual income (\$ US/month)	176	173	192
Contribution of disability grant to individual income (%)	65	65	59
Average household income (\$ US/month)	298	284	331
Contribution of disability grant to household income (%)	39	40	34
Per capita household income (\$ US/month)	93	81	109
Self-reported health (1-5 scale, 5 – excellent)	3.75	3.61	3.89
Side effects (number experienced)	2.61	3.43	2.78

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Notes: Income measures for 2006 and 2007 were adjusted to 2004 values to account for inflation. We then converted South African Rand to US Dollars using the average exchange rate for 2004.

**Table 3. Descriptive statistics for health and income by year and by employment status for those who lost disability grants between 2004 and 2006.**

	2004/05	2006	2007
<b>Individuals who lost the disability grant between the 2004/05 and 2006 surveys</b>			
Sample size	65	65	55
Employment (% working in month preceding interview)	34	43	60
Average individual income (\$ US/month)	195	89	135
Average household income (\$ US/month)	318	259	268
Per capita household income (\$ US/month)	107	79	111
Self-reported health (1-5 scale, 5 – excellent)	3.90	3.64	4.07
Side effects (number experienced)	2.42	2.81	2.01

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**Unemployed individuals who lost the disability grant between the 2004/05 and 2006 surveys**

Sample size	37	22
Average individual income (\$ US/month)	9	28
Average household income (\$ US/month)	173	194
Per capita household income (\$ US/month)	45	52
Self-reported health (1-5 scale, 5 – excellent)	3.55	3.88
Side effects (number experienced)	3.76	2.50

Notes: See Notes for Table 2.

**Table 4. Fixed effects regression estimates of the association between disability grant receipt and individual and household welfare.**

<b>Panel 1 - Economic Variables</b>			
	<i>Ln(Individual Income)</i>	<i>Ln(Household Income)</i>	<i>Employment</i>
Disability Grant	2.988* (0.254)	0.755* (0.157)	-0.035 (0.056)
Sample size	675	648	675
<b>Panel 2 - Health Variables</b>			
	<i>Self-Reported Health</i>	<i>Side Effects</i>	
Disability Grant	0.156 (0.129)	-0.007 (0.385)	
Sample Size	672	675	
<b>Panel 3 - Demographic Variables</b>			
	<i>Household Size</i>	<i>No. Under 10</i>	<i>No. Pension Eligible</i>
Disability Grant	0.052 (0.197)	0.210* (0.086)	0.009 (0.047)
Sample Size	673	673	673

Notes: Standard errors in parentheses

- \* statistically significant at 5% level
- All models include dummy variables for 2006 and 2007 survey waves, and the interaction between these variables and baseline age, time since commencing HAART and education and gender.
- Disability Grant: binary indicator = 1 if individual was receiving a grant at the time of the survey.
- Ln(individual income) and Ln(Household Income): the natural logs of individual and household income, respectively. Zero values for the income variables were coded as 1.
- Employment: binary indicator = 1 if the individual reported wage or self-employment in the month preceding the interview.
- Self-reported health: 1 – 5 Likert Scale, with 1 being poor health and 5 excellent health.
- Side effects: the total number of different side effects experienced (up to 12 possible)
- Household size, No. Under 10 and No. Pension Eligible: total number of household members in each category, respectively.

**Table 5. Fixed effects regression estimates of trends in self-reported health and side effects by baseline vulnerability**

Self Health	Reported	No Controls	With Controls
<i>Trends by Renewal</i>			
Renewal*Wave 2		0.022 (0.211)	0.052 (0.216)
Renewal*Wave 3		0.244 (0.217)	0.368 (0.223)
<i>Trends by Baseline Income Group</i>			
Poor*Wave 2		0.019 (0.218)	0.108 (0.220)
Poor*Wave 3		0.046 (0.222)	0.091 (0.223)
<b>Side Effects</b>			
<i>Trends by Renewal</i>			
Renewal*Wave 2		0.234 (0.630)	0.250 (0.651)
Renewal*Wave 3		0.368 (0.648)	0.366 (0.671)

*Trends by Baseline  
Income Group*

Poor*Wave 2	0.669 (0.646)	0.412 (0.653)
Poor*Wave 3	-0.275 (0.658)	-0.271 (0.662)

-Note: -Standard errors in parenthesis

-Indicator\*Wave refers to the interaction between the group variable and survey round

-Renewal = 1 if respondent had to renew disability grant at baseline

-Poor = 1 if individual is in the bottom quintile of the baseline income distribution

-Sample size for Renewal = 485; for Poor = 641

-Self-reported health is a 1-5 Likert Scale with 5 – excellent health

-Side Effects refers to total number of different symptoms experienced (0-12)

-Renewal = 1 if respondent had to renew disability grant at baseline

**Appendix Table 1. Instrumental variable estimates of the association between disability grant receipt and individual and household welfare.**

<b>Panel 1 - Economic Variables</b>			
	<i>Ln(Individual Income)</i>	<i>Ln(Household Income)</i>	<i>Employment</i>
Disability Grant	2.222 (1.267)	1.385* (0.687)	0.146 (0.336)
Sample size	482	457	482
<i>IV Diagnostics</i>			
Cragg-Donald Statistic	6.844	6.770	6.844
Hausman Endogeneity (p-value)	0.212 (0.645)	1.501 (0.221)	0.735 (0.391)
Sargan Overidentification (p-value)	1.387 (0.239)	1.286 (0.260)	0.013 (0.909)
<b>Panel 2 - Health Variables</b>			
	<i>Self-Reported Health</i>	<i>Side Effects</i>	
Disability Grant	-0.518 (0.784)	-1.092 (2.276)	
Sample Size	480	482	
<i>IV Diagnostics</i>			
Cragg-Donald Statistic	6.409	6.844	
Hausman Endogeneity (p-value)	0.624 (0.429)	0.541 (0.462)	
Sargan Overidentification (p-value)	2.579 (0.108)	0.092 (0.762)	
<b>Panel 3 - Demographic Variables</b>			
	<i>Household Size</i>	<i>No. Under 10</i>	<i>No. Pension Eligible</i>
Disability Grant	-0.454 (1.115)	0.206 (0.475)	0.273 (0.296)
Sample Size	480	480	480
<i>IV Diagnostics</i>			
Cragg-Donald Statistic	6.843	6.843	6.843
Hausman Endogeneity (p-value)	0.372 (0.542)	0.009 (0.925)	1.137 (0.286)
Sargan Overidentification (p-value)	1.409 (0.235)	0.388 (0.533)	0.115 (0.734)

-Note: -See Notes for *Table 4* for information on model specification and variable definitions  
 -Standard errors in parentheses  
 -\* statistically significant at 5% level  
 -Instrumental variables: Reported grant renewal (=1) in 2004 interacted with dummies for 2005 and 2007 survey waves. Because only those receiving grants in 2004 reported need for renewal, sample sizes are smaller than those reported in *Table 4*  
 -Cragg-Donald Statistic is *F-statistic* for instruments in the first stage models (not shown here)  
 -The null hypothesis of the Hausman endogeneity test is that the instrumented regressor is not determined by omitted variables that also influence the outcomes of interest. The null of the Sargan overidentification test is that the instruments are not correlated with factors other than the regressor of interest that affect the outcome.