Social grants for people living with HIV and on antiretroviral therapy in KwaZulu-Natal, South Africa: a longitudinal study

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Abstract

The aim of this study was to assess the predictors of the receipt of a disability grant (DG) status and the impact of the DG on health outcomes of HIV patients and on antiretroviral therapy (ART) in a longitudinal study over 20 months in KwaZulu-Natal, South Africa. Consecutive patients, 735 (29.8% males and 70.2% females), who attended three HIV clinics completed the assessments (with a structured questionnaire and medical file review) prior to antiretroviral initiation, 519 after 6 months, 557 after 12 months and 499 after 20 months on ART. The results indicate that a large number of HIV or ART patients were found to be in receipt of a DG, which declined significantly over the time of being on ART (from 52.3% at 6 months on ART to 9.8% at 20 months on ART). At various stages, being in receipt of a DG was found to be associated with not being employed, higher quality of life (QoL), older age, higher alcohol use score, no formal salary as household income and higher subjective health status in multivariable analyses. A significant number of patients lost their DG status over the assessment period, which was not found to be associated with major health outcomes (CD4 cell counts, adherence to ART and HIV symptoms). In a multiple regression generalized estimating equation model, not being in receipt of a DG, health-related QoL, lower HIV symptoms and lower depression scores were associated with CD4 counts. HIV patients who no longer qualify for the DG and yet do not have adequate financial means to meet basic necessities should be put on a nutritional support programme.

Keywords: *social grants, HIV patients, antiretroviral treatment, health status, KwaZulu-Natal, South Africa, longitudinal study.*

Résumé

L'objectif de cette étude était d'évaluer les indicateurs prévisionnels associés à la réception d'une pension d'invalidité et l'impact de la pension d'invalidité sur l'état de santé des patients séropositifs et sur la thérapie antirétrovirale (ART) dans une étude longitudinale réalisée sur 20 mois au KwaZulu-Natal, en Afrique du Sud. 735 patients consécutifs (29,8 % d'hommes et 70,2 % de femmes) traités dans trois centres médicaux spécialisés dans le traitement du VIH ont été évalués (à l'aide d'un questionnaire structuré et de l'étude de leur dossier médical) avant de commencer les ARV, 519 au bout de 6 mois, 557 au bout de 12 mois et 499 au bout de 20 mois de thérapie antirétrovirale (ART). Les résultats indiquent qu'un grand nombre de patients séropositifs ou sous ART bénéficiaient d'une pension d'invalidité, ce nombre diminuant de manière significative en fonction de la durée passée sous ART (de 52,3 % à six mois sous ART à 9,8 % à 20 mois sous ART). Il a été conclu qu'à différentes étapes, l'accès à une pension d'invalidité était associé, dans des analyses multivariables, au fait de ne pas être employé, à un meilleur niveau de vie, à un âge plus avancé, à une consommation d'alcool plus importante, à l'absence de salaire formel comme revenu pour le ménage et à un meilleur état de santé subjectif. Un nombre important de patients ont perdu leur pension d'invalidité au cours de la période d'étude, ce qui était associé à des résultats négatifs majeurs en matière de santé (compte de CD4, observance de l'ART et symptômes du VIH). Dans un modèle EEG de régression multiple, le fait de ne pas bénéficier de pension d'invalidité, la qualité de vie liée à la santé des patients, un nombre réduit de symptômes du VIH, des taux de dépression inférieurs étaient associés au compte de CD4. Les patients séropositifs qui n'ont plus accès à la pension d'invalidité mais ne disposent pas des moyens nécessaires pour subvenir à leurs besoins essentiels devraient être intégrés à un programme d'appui nutritionnel.

Mots clés: *Allocations sociales, patients séropositifs, traitement antirétroviral, état de santé, KwaZulu-Natal, Afrique du Sud, étude longitudinale.*

Introduction

It is estimated that about 5.7 million people were living with HIV and AIDS in South Africa in 2009, more than that in any other country (UNAIDS 2010), with the highest prevalence (39.5% in pregnant women) being found in the province of KwaZulu-Natal (Department of Health 2010). The rollout of antiretroviral therapy (ART) began in 2004, and the number of people enrolled is now the highest in the world, although adult coverage is 56% based on the World Health Organization (WHO) 2006 guidelines

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(CD4 200) and only 36% according to the WHO 2010 guidelines (CD4 350) (UNAIDS 2010). Although as people begin treatment, they can expect to live longer, most patients initiate highly active antiretroviral therapy (HAART) at advanced stages of the disease with very low CD4 counts and in poor health (May, Boulle, Phiri, Messou, Myer, Wood *et al.* 2010).

People who are sick with AIDS or ill with HIV-related opportunistic infections may be unable to look for and to take up employment opportunities, in which case they qualify for disability grants (DGs) in South Africa. The purpose of the DG for HIV-infected persons is to provide support to them until they are healthy enough to re-enter the labour force and support themselves (Department of Social Development 2009; de Paoli, Grønningsæter & Mills 2010). A general rule that applies in most hospitals and clinics throughout the country is that an individual with a CD4 count $\leq$200, which is roughly associated with clinical stage 4 AIDS, meets the clinical criteria for receiving a DG (de Paoli *et al.* 2010; Phaswana-Mafuya, Peltzer & Petros, 2009). Prior to the rollout of antiretrovirals (ARVs) in 2004, many people living with HIV (PLWHs) received DGs when they became sick from AIDS and unable to work. With access to ARVs, and therefore renewed health, many PLWHs stand to lose the grants as a result of their improved health (Hardy & Richter 2006; de Paoli *et al.* 2010). In a review, Beard, Feeley and Rosen (2009) found that compared with HIV-positive patients not yet on treatment, patients on ART reported significant improvements in physical, emotional and mental health and daily function. Work performance improved and absenteeism decreased, with the most dramatic changes occurring in the first 3 months of treatment and then levelling off (Beard *et al.* 2009), and so patients would likely lose their grants within a year of starting treatment (Venkataramani, Maughan-Brown, Nattrass & Ruger 2010).

In a cross-sectional survey among people living with HIV/AIDS (PLWHA) conducted in the Eastern Cape of South Africa, not being on a DG was associated with lower CD4 counts, often without enough food and less often without needed medicines in the past 12 months. Having the DG stopped was associated with often not having enough medicines that were needed in the past 12 months (Phaswana-Mafuya *et al.* 2009). Conclusions drawn from this study were that PLWHA who no longer qualify for the DG and yet do not have adequate financial means to meet basic necessities should be put on a nutritional support programme and access to the location of the grants by the poor and vulnerable should be improved (Phaswana-Mafuya *et al.*, 2009). Using a longitudinal data set of HAART patients in Khayelitsha, Cape Town, Venkataramani *et al.* (2010) found that grant loss was associated with sizeable declines in income and changes in household composition. However, no evidence of individuals choosing poor health over grant loss was found. Venkataramani *et al.* (2010:1399) concluded that 'large drops in income and changes in household composition follow the loss of a disability grant illustrate the need to investigate alternate social welfare programmes for unemployed AIDS patients and/or more effective mechanisms to smooth consumption and income over time'.

The aim of this study was to assess the predictors of the receipt of DG status and the impact of the DG on health outcomes of HIV patients and on ART in a longitudinal study over 20 months in KwaZulu-Natal, South Africa.

Methods

Sampling and procedure

This is a prospective study of all treatment-naive patients (N = 735) recruited from the three public hospitals in Uthukela Health District in KwaZulu-Natal from October 2007 to February 2008. All ARV-naive patients who were about to commence the use of ARVs ($\geq$18 years) and who consecutively attended the HIV clinics during the recruitment period were eligible for this study. Systematic sampling was used by asking healthcare providers for referrals of ART-naive patients (eligible for ARV treatment but who had not yet commenced ARV treatment). Physicians from the three selected public clinics asked every consecutively visiting ART-naive patient meeting the inclusion criteria of being 18 years or over if he or she would like to complete a confidential survey and interview concerning his or her health and social situation. This would include information from his or her medical records on details of his or her medical condition, laboratory tests and treatment. It was made clear to the patients that their participation in this study was voluntary and a decision not to participate would not affect their medical care. If the potential participant indicated an interest in participating, the healthcare provider then referred him or her to an external Human Sciences Research Council (HSRC) research assistant. ART-naive patients were then asked to sign and complete a consent form before the interview took place in a private area in or outside the clinic. The interviews were conducted by four trained external HSRC researchers (one or two per HIV clinic) in interview administration of the semi-structure interview schedule. Permission to access patient medical records was sought from both the patient and the health worker/manager. Questionnaires were anonymized, with no personal identifying information recorded on them. Recruitment took place over a period of 4 months, with 97.8% participation rate. Data were collected using an interviewer-administered semi-structured questionnaire.

The questionnaire was translated into the major language spoken in the study area (Zulu) and verified by a second translator. Where inconsistencies were found, they were corrected (Peltzer, Friend-du Preez, Ramlagan & Fomundam 2008). The patients were then interviewed again at the 6, 12 and 20 months' clinic visits after initiation of the use of ARVs. Patients who did not attend the planned follow-up were contacted by telephone and up to two home visits before being considered lost to follow-up. The study protocol was approved by the HSRC ethics committee, the KwaZulu-Natal Department of Health, the Uthukela Health District and the three superintendents of the three study hospitals.

Measures

The patients were interviewed with an anonymous questionnaire that requests information on socio-demographic characteristics, DG status, clinical history and health-related characteristics and health beliefs. Clinical data relating to date of HIV diagnosis, HIV acquisition and transmission risk factors, current CD4 cell count and viral load (Chiron 3.0 bDNA) were obtained from the medical chart.

Adherence assessment

The 30-day visual analogue scale (VAS) provided an overall adherence assessment for a longer time interval. The VAS is a valid tool for assessing medication adherence (Kalichman, Amaral, Swetzes, Jones, Macy, Kalichman *et al.* 2009) and has been validated in resource-limited settings (e.g. Maneesriwongul, Tulathong, Fennie & Williams 2006). Adherence was calculated as the % of doses taken over those prescribed. Adherence levels assessed from the VAS are defined as follows: full adherence = 100%, partial adherence ≥95% and <100% and non-adherence as <95% of prescribed doses taken since the last refill. The minimum level of adherence required for ARVs to work effectively is 95% (Lima, Harrigan, Murray, Moore, Wood, Hogg *et al.* 2008).

The revised Sign and Symptom Checklist for persons with HIV disease

The SSC-HIVrev is a 72-item checklist of HIV/AIDS-specific physical and psychological symptoms, scored using the following scale: 0 = not checked (not present today), 1 = mild, 2 = moderate, 3 = severe (Holzemer, Hudson, Kirksey, Hamilton & Bakken, 2001). Validity and reliability of the instrument have been reported previously for a US sample (Holzemer *et al.* 2001) and various African countries (Makoae, Seboni, Molosiwa, Moleko, Human, Sukati *et al.* 2005) including South Africa (Peltzer & Phaswana-Mafuya 2008); reliability was from 0.76 to 0.94. The Cronbach reliability α coefficient of this 64-item scale was 0.95 at baseline and 0.84, 0.95 and 0.78 for the three subsequent assessment periods, indicating excellent internal consistency reliability of the items.

Alcohol use disorder

Alcohol Use Disorder Identification Test (AUDIT)-C was used to assess the consumption of alcohol in patients (i.e. the frequency of drinking, the quantity consumed at a typical occasion and the frequency of heavy episodic drinking) (Babor, Higgens-Biddle, Saunders & Monteiro 2001). Heavy episodic drinking is defined as the consumption of five standard drinks or more on a single occasion. In South Africa, a standard drink is 12 g alcohol. Because AUDIT is reported to be less sensitive at identifying risk drinking in women (Freeborn, Polen, Hollis & Senft 2000), the cut-off points of binge drinking for women were reduced by one unit compared with those for men. The Cronbach alpha coefficient for the AUDIT-C in this sample ranged from 0.85 to 0.91 across the assessments.

Health-related quality of life

The WHOQOL-HIV BREF is based on the WHOQOL-HIV measure, one of the two WHO's quality of life (QoL) instruments for use in HIV-infected populations

(O'Connell, Saxena & Skevington, 2004; World Health Organization (WHO), 2002). The individual respondent's overall QoL is measured directly using the following: 'How would you rate your quality of life?' (ranging from 'very poor' to 'very good') and 'How satisfied are you with your health?' (ranging from 'very dissatisfied' to 'very satisfied'). The 31-item WHOQOL-HIV BREF produces six domain scores, which denote an individual's subjective perception of his or her own QoL in the following domains: physical and psychological symptoms, level of independence, social relationships, physical environment and spirituality. The individual items are rated on a five-point Likert scale, where '1' indicates 'low, negative perceptions' and '5' indicates 'high, positive perceptions'. Domain scores are scaled in a positive direction, where higher scores denote higher perceived QoL (WHOQOL 2003). The Cronbach α reliability coefficient of this 29-item scale was 0.80 at baseline and 0.88, 0.88 and 0.92 for the three subsequent assessment periods, indicating good internal consistency reliability of the items.

Depression

Depression symptoms were assessed using the 10-item version of the Centers for Epidemiologic Studies Depression Scale (CES-D) (Andresen, Malmgren, Carter & Patrick 1994). The CES-D has been widely used in studies of the relationship between HIV and depression (e.g. Kilbourne, Justice, Rollman, McGinnis, Rabeneck, Weissman *et al.* 2002). While the CES-D 10-item survey has not been directly compared with the clinical diagnosis of major depression, the sensitivity and specificity of the CES-D 20-item survey have been reported to average 80% and 70%, respectively, compared with those of formal diagnostic interview (Mulrow, Williams, Gerety, Ramirez, Montiel & Kerber 1995). The Cronbach α reliability coefficient of this 10-item scale was 0.83 at baseline and 0.63, 0.74 and 0.78 for the three subsequent assessment periods, indicating moderate internal consistency reliability of the items.

Social support

Three items were drawn from the Social Support Questionnaire to assess perceived social support (Brock, Sarason, Sarason & Pierce, 1996), as used by Simbayi, Kalichman, Strebel, Cloete, Henda and Nqeketo (2007). The items were selected to reflect perceived tangible and emotional support. The Cronbach α reliability coefficient of this three-item scale was 0.84 at Time 2, 0.89 at Time 3 and 0.92 at Time 4 assessment periods, indicating excellent internal consistency reliability of the items.

Data analysis

Data were analysed using Statistical Package for the Social Sciences for Windows software application programme version 17.0. Frequencies, means and standard deviations were calculated to describe the sample. Predictors of DG recipient status and loss of DG recipient status were identified using logistic regression analyses. Following each univariate regression, multivariable regression models were constructed. Independent variables from the univariate analyses were entered into the multivariable model if significant at $P < 0.05$ level. Cases with missing data were excluded from the multivariable models. For each model, the R^2 are presented to describe the amount of variance explained by the multivariable model. Probability below 0.05 was regarded as statistically significant. To identify the pattern of factors characterizing high levels of CD4 count at any assessment, linear regression models based on generalized estimating equations (GEEs) were used. These models allowed for considering the correlation of within-subject repeated measures (Twisk 1997). The univariate analyses used simple linear regression to identify factors associated with CD4 counts; variables with P-values less than 0.05 were entered in the corresponding multiple regression model. A forward procedure based on the quasi-likelihood ratio test produced the final model.

Table 1. Sample characteristics and study attrition analysis

	Baseline (Time 1)		Stayed (Time 4)			
Variable	***N* = 735 or *M***	**% or SD**	***N* = 499**	**% or SD**	**χ^2 or *t*-test**	***P***
Sex						
Male	217	29.5	137	63.1	3.20	0.07
Female	518	70.5	362	69.9		
Age, range 18–67	35.9	9.7	36.1	9.5	−0.82	0.42
Education						
Grade 7 or less	279	38.1	199	71.3	4.39	0.04
Grades 8–11	314	42.9	214	68.2	0.02	0.90
Grade 12 or more	139	19.0	84	60.4	4.39	0.04
Religion						
African or none	187	25.5	121	64.7	1.17	0.28
Main stream Christian	154	20.9	99	64.3	1.16	0.28
Charismatic	271	36.9	194	71.6	2.69	0.10
Others	123	16.7				
Residence						
Rural (village)	338	46.2	215	63.6	5.19	0.02
Rural (farm)	125	17.1	95	76.0	4.59	0.03
Urban (informal settlements)	41	5.6	32	78.0	2.07	0.15
Urban (formal settlements)	227	31.1	154	67.8	0.00	1.00
Employment status						
Housewife/houseman	99	13.5	74	74.7	2.37	0.12
Unemployed	448	60.9	290	64.7	5.78	0.02
Employed	148	20.2	110	74.3	3.38	0.07
Pensioner/disabled/student	25	3.4	14	56.0	1.72	0.19
Others	12	1.6				
Missing	3	0.4				
Income (multiple response)						
Formal salary	215	29.9	157	73.0	2.94	0.09
Family member contributions	133	18.5	89	66.9	0.18	0.67
Social grants	264	36.7	182	68.9	0.04	0.84
DG (for chronic illness)	129	23.8	89	69.0	0.27	0.61
Child care support grant	383	52.3	262	68.4	0.13	0.71
No income	57	7.9	38	63.2	0.81	0.37
Time since HIV diagnosis						
≤1 year (2007/2008)	540	73.5	367	68.0	0.01	0.95
1–2 years (2006)	73	9.9	55	75.3	2.06	0.15
>2 years (2005–1995)	122	16.6	77	63.1	1.53	0.22
CD4 count (cells/μL)						
1–99	106	19.7	91	85.8	0.20	0.66
100–349	345	64.2	300	87.0	0.03	0.86
≥350	86	16.0	77	89.5	0.52	0.47
Number of HIV symptoms (range 0–64)	7.2	9.5	6.8	9.3	2.64	0.008
Social support (range 3–12)	Not assessed		7.3	1.1		
AUDIT score (range 0–12)	0.4	1.4	0.6	1.3	−0.78	0.43

Table 2. Descriptive statistics and predictors of DG recipient status at Time 1 ($N = 735$), Time 2 ($N = 519$), Time 3 ($N = 557$) and Time 4 ($N = 499$)

Variable	Time 1 (prior to ART)		Time 2 (6 months on ART)		Time 3 (12 months on ART)		Time 4 (20 months on ART)	
DG or no DG	% or *M*	CrOR (CI 95%) [adjusted OR, R^2 0.50]	% or *M*	CrOR (CI 95%) [adjusted OR R^2 0.09]	% or *M*	CrOR (CI 95%) [adjusted OR R^2 0.38]	% or *M*	CrOR (CI 95%) [adjusted OR R^2 0.39]
All	23.8		52.3		43.6		9.8	0.54 (0.24–1.19)
Male	23.5	Ref	53.4	1.06 (0.71–1.57)	40.4	0.84 (0.56–1.25)	7.7	
Female	24.0	0.97 (0.63–1.500	51.9		44.7		10.6	
Age in years	35.5/ 36.5	0.99 (0.97–1.01)	37.2/ 34.9	1.03 (1.01–1.04)**[*]	38.8/ 34.1	1.06 (1.04–1.08)***	44.9/ 35.3	1.10 (1.07–1.13)***[***]
Education		1.12 (1.02–1.22)*		0.94 (0.87–1.01)		0.88 (0.81–0.95)***		0.87 (0.75–1.00)
Employed	6.1	0.17 (0.07–0.40)***[**]	38.1	0.46 (0.30–0.71)***	38.4	0.74 (0.48–1.15)	2.1	0.16 (0.04–0.67)**
Not employed	27.8		57.1		45.6		12.0	
Formal salary *vs.* others	20.9 30.6	1.67 (1.11–2.50)*	42.1 56.8	0.55 (0.38–0.81)**[*]	39.6 46.2	0.77 (0.52–1.12)	8.3 10.5	0.78 (0.39–1.55)
CD4 count (cells/μL)	108/ 108	1.00 (0.997–1.003)	143/ 151	0.999 (0.998–1.001)	193/ 233	0.998 (0.997–0.999)**	521/ 460	1.00 (1.00–1.003)
Adherence to ART (≥95%)		DG No DG	83.3 82.5	1.06 (0.67–1.68)	87.3 90.5	0.72 (0.41–1.26)	99.7 90.4	4.57 (0.61–34.10)
Alcohol use score (range 0–12)	0.8/0.2	1.34 (1.16–1.55)***	2.2/ 1.5	1.13 (0.83–1.55)	1.5/ 0.2	1.80 (1.16–2.80)***[*]	1.0/0.6	1.21 (0.64–2.28)
General QoL[a] (range 1–5)	4.1/3.6	2.23 (1.72–2.88)***	3.7/ 3.6	1.29 (0.99–1.67)	4.6/ 4.5	1.23 (0.92–1.66)	4.5/4.4	1.21 (0.80–1.84)
General health[a] (range 1–5)	4.2/3.7	1.43 (1.11–1.84)**	3.7/ 3.6	1.43 (1.11–1.84)**[*]	4.6/ 4.5	1.36 (0.99–1.87)	4.7/4.5	1.63 (0.97–2.75)
Physical domain[b]	16.6/ 14.4	1.31 (1.22–1.41)***	15.1/ 14.3	1.00 (0.94–1.07)	15.6/ 15.0	1.12 (1.04–1.21)**	16.7/ 14.3	1.53 (1.33–1.76)***
Psychological domain[b]	16.5/ 12.9	1.49 (1.37–1.61)***[***]	13.5 13.6	1.00 (0.94–1.05)	14.3/ 13.9	1.04 (0.98–1.10)	16.1/ 13.2	140 (1.25–1.57)***[**]
Independence domain[b]	14.4/ 13.3	1.22 (1.12–1.34)***	13.6/ 12.8	1.08 (0.98–1.18)	15.2/ 14.8	1.18 (1.04–1.34)**	15.3/ 14.5	1.29 (1.05–1.58)*
Social relationship domain[b]	14.7/ 11.8	1.58 (1.42–1.76)***[***]	12.3/ 12.2	0.98 (0.92–1.05)	13.6/ 13.8	0.96 (0.98–1.04)	14.1/ 14.0	1.01 (0.90–1.14)
Environment domain[b]	14.9/ 12.5	1.42 (1.30–1.55)***	12.8/ 12.9	1.00 (0.93–1.07)	14.0/ 13.9	1.02 (0.94–1.11)	15.0/ 13.0	1.38 (1.19–1.60)***
Spirituality/religion/ personal belief domain[b]	15.6/ 13.6	1.45 (1.33–1.60)***[*]	14.2/ 15.1	0.98 (0.92–1.04)	15.1/ 14.7	1.06 (0.99–1.13)	16.4/ 14.2	1.49 (1.28–1.73)
HIV symptoms (range 0–64)	15.1/ 6.3	1.08 (1.05–1.11)*** [***]	1.2/ 1.2	0.99 (0.93–1.06)	0.2/ 0.4	0.98 (0.87–1.07)	0.3/0.1	1.15 (0.87–1.57)
Depression symptoms (range 0–40)	19.5/ 16.2	1.05 (10.3–1.08)***	15.6/ 15.8	0.98 (0.94–1.03)	17.0/ 16.4	1.04 (0.99–1.09)	12.2/ 13.4	0.89 (0.80–1.00)*
Social support (range 3–12)		Not assessed	6.4/ 7.0	0.90–0.83–0.97)**[*]	6.6/ 6.9	0.94 (0.88–1.02)	6.6/7.2	0.58 (0.44–0.77)***
Traced dead at Time 3	12.4/ 11.2	1.13 (0.61–2.07)	0.8/ 1.1	1.37 (0.23–8.28)				

Note: CrOR, Crude Odds Ratio.

[a]Mean scores range from 1 to 5, with 5 indicating the highest, most positive perceptions of QoL or general health perceptions.

[b]Overall domain scores range from 4 to 20, with 20 indicating the highest, most positive perceptions.

***$P < 0.001$.

**$P < 0.01$.

*$P < 0.05$.

Results

A total of 735 patients (217 men and 518 women) completed a baseline questionnaire at Time 1 prior to initiating ART. Follow-up questionnaires were completed at 6 months of follow-up by 519 patients within this cohort (139 men and 370 women) who had now been on ART for 6 months, at 12 months later by 557 patients within this cohort (157 men and 396 women) and at 20 months later by 499 patients (126 men

Table 3. Descriptive statistics and predictors for those who lost DGs from Time 1 to Time 4 and from Time 2 to Time 4

	Lost DG from Time 1 to Time 4		Lost DG from Time 2 to Time 4	
Outcome variable at Time 4	% or M	CrOR (CI 95%)	% or M	CrOR (CI 95%)
All	19.7		46.9	
Male	23.6	0.72 (0.42–1.24)	49.5	0.86 (0.56–1.33)
Female	18.1		45.9	
CD4 count (cells/μL)	441	0.999 (0.998–1.00)	465	1.00 (0.999–1.001)
	481		476	
Adherence to ART (≥95%)	97.2	3.70 (0.86–15.90)	90.7	0.77 (0.38–1.56)
	90.4		92.7	
General health[a] (range 1–5)	4.4	0.80 (0.63–1.01)	4.1	0.60 (0.46–0.77)***
	4.6		4.6	
HIV symptoms	0.08	1.01 (0.66–1.53)	0.1	0.88 (0.69–1.12)
	0.08		0.2	
Depression symptoms (range 0–40)	12.4	0.91 (0.84–0.99)*	13.5	1.04 (0.99–1.10)
	13.6		13.0	
Social support (range 3–12)	6.3	0.43 (0.33–0.51)***	7.2	1.01 (0.85–1.20)
	7.3		7.1	

Note: CrOR, Crude Odds Ratio.

[a]Mean scores range from 1 to 5, with 5 indicating the highest general health perceptions.

***$P < 0.001$.

**$P < 0.01$.

*$P < 0.05$.

and 333 women); 122 (16.9%) participants were lost to follow-up (including transfers), and 83 (11.5%) were known to have died, of whom, 75 had already died at 6 months of follow-up, 72 transferred care elsewhere, 14 refused participation, 12 were not initiated on ART and 50 (6.9%) could not be traced. At Time 4, HIV medications for 380 (76.3%) patients included lamivudine (3TC), stavudine (d4T) + efavirenz and for 118 patients (23.7%) included 3TC and d4T + nevirapine.

Sample characteristics

The mean age of the participants at baseline assessment was 35.9 years (SD = 9.7) and the educational level of the majority (81.0%) was less than grade 12. Almost three-quarters (71.8%) were never married, 61.2% were unemployed and 20.2% were employed, more than half (52.3%) had a child care grant, 29.9% had a formal salary and 7.9% had no income. Almost two-thirds (63.3%) resided in a rural area, most (73.5%) had been recently (within the past year) diagnosed as being HIV positive and almost all (96.1%) had disclosed their HIV status to someone. While baseline characteristics were similar between men and women, women were more likely to be younger and receiving social (including child care) grants and men were more likely to be married or cohabitating, employed and having a formal salary. The median CD4 count at 20 months of follow-up was 446 cells/mm^3 compared with 261 cells/mm^3 at 12 months of follow-up and 130 cells/mm^3 at 6 months of follow-up and compared with 119 cells/mm^3 prior to ARV initiation. Study attrition analysis comparing the participants who left the study with those who stayed found significant differences in terms of lower educational level, rural residence, employment status (which is probably a function of increased mobility for higher educated in getting work in urban areas) and lower HIV symptoms in who stayed in the study and no significant differences in terms of gender, age, religion, income, time since HIV diagnosis, CD4 cell counts, internalized stigma, discrimination experience and alcohol use (see Table 1).

Descriptive statistics and predictors of DG recipient status over time

In all, 23.8% of the participants at Time 1, 52.3% at Time 2, 43.6% at Time 3 and 9.8% at Time 4 were in receipt of a DG.

Univariate and multivariable models that were used to determine the predictors of DG recipient status for Times 1, 2, 3 and 4 separately are given in Table 2. In multivariable analyses, not being employed, higher psychological QoL, higher social relationship QoL, higher spiritual/religion/personal belief QoL and higher frequency of HIV symptoms were associated with DG recipient status at Time 1; older age, no formal salary as household income, higher subjective health status and lack of social support were associated with DG recipient status at Time 2; an higher alcohol use score was associated with DG recipient status at Time 3; and older age and higher psychological QoL were associated with DG recipient status. It is notable that lower CD4 cell counts were only associated with DG recipient status at Time 3 and not at other time points. Higher HIV symptoms and depression symptoms were only associated with DG recipient status at Time 1 and not at other time points, and adherence to ART was not associated with DG recipient status at any assessment time points. From those participants who were traced dead at Time 3, no association was found between

Table 4. Factors associated with CD4 count during the first 20 months following initiation of ART: simple and multiple linear regression models based on GEE

Variables	B coefficient (95% CI)	P	Adjusted B coefficient (95% CI)[a]	P
In receipt of a DG	−71.06 (−86.23 to −55.88)	0.000	−67.67 (112.42–238.45)	0.000
Socio-demographics				
Males (*vs.* females)	−14.36 (−29.99 to −1.27)	0.072	–	
Age in years	0.41 (−0.38 to −1.19)	0.309	–	
Education	−0.01 (−0.03 to −0.01)	0.470	–	
Grade 7 or less	Ref.			
Grades 8–11	10.78 (−5.63 to −27.19)	0.198	6.79 (−10.74 to −24.32)	0.448
Grade 12 or more	−20.96 (−41.18 to −0.74)	0.042	−27.14 (−48.22 to −6.07)	0.012
Employed (*vs.* not employed)	26.73 (9.30–43.96)	0.002	11.22 (−7.54 to −29.98)	0.241
Formal salary (*vs.* others)	11.21 (−4.43 to −26.85)	0.160	–	
Urban (*vs.* rural)	14.43 (−0.33 to −29.20)	0.055	–	
Health variables				
Time since HIV diagnosis				
≤1 year (2007/2008)	Ref.			
1–2 years (2006)	25.00 (−6.77 to −56.76)	0.123	–	
>2 years (2005–1995)	3.52 (−17.38 to −24.41)	0.741	–	
HRQoL	5.95 (2.48–9.43)	0.001	9.15 (5.34–12.95)	0.000
HIV symptoms	−6.90 (−7.85 to −5.95)	0.000	−5.67 (−6.81 to −4.52)	0.000
Depression symptoms	−4.83 (−6.10 to −3.57)	0.000	−5.67 (−6.81 to −4.52)	0.000
AUDIT score	−0.88 (−6.43 to −4.66)	0.755	–	

Note: All variables with $P < 0.05$ in the baseline CD4 cell count-adjusted model were eligible for the multivariate model.

[a]Goodness-of-fit quasilikelihood under the Independence model criterion value = 6.337.

traced dead and DG recipient status at Time 1 and Time 2 (see Table 2).

Descriptive statistics and predictors of those who lost DG recipient status over time

From participants who were in receipt of a DG at Time 1 (prior to being on ART), 72 (19.7%) lost the DG status at Time 4 (20 months on ART), and from participants who were in receipt of a DG at Time 2 (6 months on ART), 194 (46.9%) lost the DG status at Time 4 (20 months on ART). Univariate analyses were used to determine the predictors of DG recipient status for loss of DG recipient status from Time 1 to Time 4 and from Time 2 to Time 4, separately. Loss of DG recipient status (from Time 1 and from Time 2 to Time 4) did not influence major health outcomes (CD4 cell counts, adherence to ART and HIV symptoms) (see Table 3).

Predictors of health outcome (CD4 counts)

To identify the pattern of factors characterizing high levels of CD4 counts at any assessment, linear regression models based on GEEs were used. In univariate analyses, not being in receipt of a DG, not having Grade 12 or more education, being employed, health-related QoL (HRQoL), lower HIV symptoms and lower depression scores were associated with the CD4 counts. In the multiple regression GEE model, not being in receipt of a DG, HRQoL, lower HIV symptoms and lower depression scores were associated with the CD4 counts (see Table 4).

Discussion

In this longitudinal study, a large number of HIV or ART patients were found to be in receipt of a DG, which declined significantly over the time of being on ART (from 52.3% at 6 months on ART to 9.8% at 20 months on ART). In multivariable analyses, at various stages, being in receipt of a DG was found to be associated with not being employed, higher psychological QoL, higher social relationship QoL, higher spiritual/religion/personal belief QoL and higher frequency of HIV symptoms at Time 1, and at later stages on ART (Times 2–4), it was found to be associated with older age, higher alcohol use score, no formal salary as household income, higher subjective health status, higher psychological QoL and lack of social support. In all or most of the stages from Time 1 (prior to ART) to Time 4 (20 months on ART), lower CD4 cell counts, HIV symptoms, depression symptoms and ART adherence were not associated with DG recipient status. Also, from those participants who were traced dead at Time 3 (12 months on ART), no association was found between traced dead and DG recipient status at Time 1 and Time 2. In a cross-sectional survey of PLHIV (mixed being on ART and not on ART) in the Eastern Cape of South Africa, Phaswana-Mafuya *et al.* (2009) found that not being in receipt of a DG was associated with lower CD4 cell counts. This finding was only found at Time 3

(12 months on ART) in this study and not at other assessment points.

A significant number of patients lost their DG status from Time 1 (prior to ART) and from Time 2 (6 months on ART) to Time 4 (20 months on ART), 19.7% and 46.9%, respectively. It was found that the loss of DG recipient status (from Time 1 and from Time 2 to Time 4) was not associated with major health outcomes (CD4 cell counts, adherence to ART and HIV symptoms). Similarly, Venkataramani *et al*. (2010) also found no association between grant loss and self-reported health status or side effects from HAART in their study in Cape Town, and Phaswana-Mafuya *et al*. (2009) also found no associations between loss of DG status and health outcomes (CD4 cell counts and ART adherence) in the Eastern Cape study.

Furthermore, this study found that in a multiple regression GEE model, not being in receipt of a DG, HRQoL, lower HIV symptoms and lower depression scores were associated with CD4 counts. The association between not being in receipt of a DG and higher CD4 counts can be explained by the fact that patients with improved CD4 cell counts are taken off the DG.

Limitations

Viral load data were only available for a few participants and were, therefore, excluded from the analyses. Furthermore, the assessment of ART adherence and other measures relied on self-report. The study results may be biased in favour of those who survived and were healthy enough to participate at follow-up. Sample attrition is a methodological artefact that can potentially influence longitudinal studies (Burgoyne, Rourke, Behrens & Salit 2004). The findings are derived from a sample of men and women residing in one district in one province in South Africa. Thus, caution is urged in generalizing the findings to other districts and provinces in the country. This study did not assess in detail income at different assessment points and could, therefore, not assess changes of this over time. Venkataramani *et al*. (2010) found that DG termination was associated with lower individual and household incomes, especially for those who could not find employment after grant loss. Finally, this is not a randomized control trial since there are no baseline measurements *prior* to taking up grants, and there is no randomization to the receipt of the grant among those eligible.

Conclusion

The results of various empirical tests did not support anecdotal evidence that individuals declined or modified treatment to continue receiving DGs, despite large decreases in receipt of the DG. Thus, similar to that of the Cape Town study (Venkataramani *et al*. 2010), this particular cohort of HIV and ART patients did not appear to be willing to sacrifice health for continued access to the DG. PLWHA who no longer qualify for the DG and yet do not have adequate financial means to meet basic necessities should be put on a nutritional support programme and access to the location of the grants by the poor and vulnerable should be improved. Many HIV and ART patients may not only depend on the provision of medicine but may also depend on economic support (Hardon, Akurut, Comoro, Ekezie, Irunde, Gerrits *et al*. 2007; Russell, Seeley, Ezati, Wamai, Were & Bunnell 2007; Tuller, Bangsberg, Senkungu, Ware, Emenyonu & Weiser 2009).

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References

Andresen, E.M., Malmgren, J.A., Carter, W.B., & Patrick, D.L. (1994). Screening for depression in well older adults: evaluation of a short form of the CES-D (Center for Epidemiologic Studies Depression Scale). American Journal of Preventive Medicine, 10(2), 77–84.

Babor, T.F., Higgens-Biddle, J.C., Saunders, J.B., & Monteiro, M.G. (2001). AUDIT: The Alcohol Use Disorders Identification Test. Guidelines for Use in Primary Care. Geneva, World Health Organization, Department of Mental Health and Substance Dependence, WHO/MSD/MSB/01.6a..

Beard, J., Feeley, F., & Rosen, S. (2009). Economic and quality of life outcomes of antiretroviral therapy for HIV/AIDS in developing countries: a systematic literature review. AIDS Care, 21(11), 1343–1356.

Brock, D., Sarason, I., Sarason, B., & Pierce, G. (1996). Simultaneous assessment of perceived global and relationship-specific support. Journal of Social and Personal Relationships, 13, 143–152.

Burgoyne, R.W., Rourke, S.B., Behrens, D.M., & Salit, I.E. (2004). Long-term quality-of-life outcomes among adults living with HIV in the HAART era: the interplay of changes in clinical factors and symptom profile. AIDS and Behavior, 8(2), 151–163.

Department of Health (2010). National Antenatal Sentinel HIV and Syphilis Prevalence Survey in South Africa, 2009. Pretoria, Department of Health.

Department of Social Development (2009) Disability grants. http://www.info.gov.za/aboutsa/socialdev.htm (Accessed 3 August 2011).

Freeborn, D.K., Polen, M.R., Hollis, J.F., & Senft, R.A. (2000). Screening and brief intervention for hazardous drinking in an HMO: effects on medical care utilization. Journal of Behavioral Health Services and Research, 27(4), 446–453.

Hardon, A.P., Akurut, D., Comoro, C., Ekezie, C., Irunde, H.F., Gerrits, T., et al. (2007). Hunger, waiting time and transport costs: time to confront challenges to ART adherence in Africa. AIDS Care, 19(5), 658–665.

Hardy, C. & Richter, M. (2006). Disability grants or antiretrovirals? A quandry for people with HIV/AIDS in South Africa. African Journal of AIDS Research, 5(1), 85–96.

Holzemer, W.L., Hudson, A., Kirksey, K.M., Hamilton, M.J., & Bakken, S. (2001). The revised Sign and Symptom Check-list for HIV (SSC-HIVrev). Journal of the Association of Nurses in AIDS Care, 12(5), 60–70.

Joint United Nations Programme on HIV/AIDS (UNAIDS) (2010). UNAIDS Report on the Global AIDS Epidemic 2010. Geneva, Switzerland, UNAIDS.

Kalichman, S.C., Amaral, C.M., Swetzes, C., Jones, M., Macy, R., Kalichman, M.O., et al. (2009). A simple single-item rating scale to measure medication adherence: further evidence for convergent validity. Journal of the International Association of Physicians in AIDS Care, 8(6), 367–374.

Kilbourne, A., Justice, A., Rollman, B., McGinnis, K., Rabeneck, L., Weissman, S., et al. (2002). Clinical importance of HIV and depressive symptoms among veterans with HIV infection. Journal of General Internal Medicine, 17(7), 512–520.

Lima, V., Harrigan, R., Murray, M., Moore, D., Wood, E., Hogg, R., et al. (2008). Differential impact of adherence on long-term treatment response among naive HIV-infected individuals. AIDS, 22, 2371–2380.

Makoae, L.N., Seboni, N.M., Molosiwa, K., Moleko, M., Human, S., Sukati, N.A., et al. (2005). The symptom experience of people living with HIV/AIDS in Southern Africa. Journal of the Association of Nurses in AIDS Care, 16(3), 22–32.

Maneesriwongul, W.L., Tulathong, S., Fennie, K.P., & Williams, A.B. (2006). Adherence to antiretroviral medication among HIV-positive patients in Thailand. Journal of the Acquired Immune Deficiency Syndrome, 43(Suppl 1), S119–S122.

May, M., Boulle, A., Phiri, S., Messou, E., Myer, L., Wood, R., et al. (2010). Prognosis of patients with HIV-1 infection starting antiretroviral therapy in sub-Saharan Africa: a collaborative analysis of scale-up programmes. Lancet, 376(9739), 449–457.

Mulrow, C.D., Williams, J. W.Jr., Gerety, M.B., Ramirez, G., Montiel, O.M., & Kerber, C. (1995). Case-finding instruments for depression in primary care settings. Annals of Internal Medicine, 122, 913–921.

O'Connell, K., Saxena, S., Skevington, S.M., & WHOQOL HIV Group (2004). WHOQOL-HIV for quality of life assessment among people living with HIV and AIDS: results from a field test. AIDS Care, 16(7), 882–889.

de Paoli, M. M., Grønningsæter, A. B. & Mills, E. (2010). HIV/AIDS, the Disability Grant and ARV Adherence: Summary Report. http://www.fafo.no/pub/rapp/20172/20172.pdf (Accessed 20 February 2011).

Peltzer, K., Friend-Du Preez, N., Ramlagan, S., & Fomundam, H. (2008). Use of traditional, complementary and alternative medicine (TCAM) for HIV patients in KwaZulu-Natal, South Africa. BMC Public Health, 8(1), 255, doi:10.1186/1471-2458-8-255.

Peltzer, K. & Phaswana-Mafuya, N. (2008). The symptom experience of people living with HIV/AIDS in the Eastern Cape, South Africa. BMC Health Services Research, 8(1), 271, doi: 10.1186/1472-6963-8-271.

Phaswana-Mafuya, N., Peltzer, K., & Petros, G. (2009). Disability grant for people living with HIV/AIDS in the Eastern Cape of South Africa. Social Work & Health Care, 48(5), 533 – 550.

Russell, S., Seeley, J., Ezati, E., Wamai, N., Were, W., & Bunnell, R. (2007). Coming back from the dead: living with HIV as a chronic condition in rural Africa. Health Policy and Planning, 22(5), 344 – 347.

Simbayi, L.C., Kalichman, S., Strebel, A., Cloete, A., Henda, N., & Nqeketo, A. (2007). Internalized stigma, discrimination, and depression among men and women living with HIV/AIDS in Cape Town, South Africa. Social Science & Medicine, 64(9), 1823 – 1831.

Tuller, D.M., Bangsberg, D.R., Senkungu, J., Ware, N.C., Emenyonu, N., & Weiser, S.D. (2010). Transportation costs impede sustained adherence and access to HAART in a clinic population in southwestern Uganda: a qualitative study. AIDS and Behavior, 14(4), 778 – 784.

Twisk, J. (1997). Different statistical models to analyze epidemiological observational longitudinal data: an example from the Amsterdam Growth End Health Study. International Journal of Sports Medicine, 18(3), 216 – 224.

Venkataramani, A.S., Maughan-Brown, B., Nattrass, N., & Ruger, J.P. (2010). Social grants, welfare, and the incentive to trade-off health for income among individuals on HAART in South Africa. AIDS and Behavior, 14(6), 1393 – 1400.

World Health Organization (WHO) (2002). WHOQOL-HIV Instrument User's Manual: Scoring and Coding for the WHOQOL-HIV Instruments. Geneva, WHO.

WHOQOL (World Health Organization's Quality of Life HIV Instrument HIV Group) (2003). Initial steps to developing the World Health Organization's Quality of Life Instrument (WHOQOL) module for international assessment in HIV/AIDS. AIDS Care, 15(3), 347 – 357.