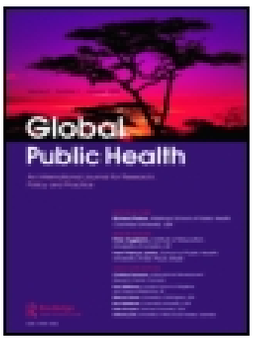

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Relationships between poverty and AIDS Illness in South Africa: an investigation of urban and rural households in KwaZulu-Natal

Janina Isabel Steinert, Lucie Cluver, G.J. Melendez-Torres[†] and Rocio Herrero Romero

Department of Social Policy and Intervention, University of Oxford, Oxford, UK

ABSTRACT

The association between poverty and HIV/AIDS in Sub-Saharan Africa remains contested. A better understanding of the relationship between the prevalence of poverty and the disease is essential for addressing prevention, treatment, and care. The present study interrogates this relationship, using a cross-sectional survey of 2477 households in urban and rural KwaZulu-Natal, South Africa. Structural equation modelling was employed to estimate the correlations between poverty and AIDS illness. The analysis revealed a correlation of $r_{pb} = 0.23$, denoting that a higher level of household poverty was associated with a higher likelihood of being AIDS-unwell. *Post hoc* *t*-test showed that receipt of a disability grant by AIDS-affected households was associated with significantly lower poverty, compared to AIDS-affected households not receiving the grant, $t(654) = 3.67$, $p < .01$. Geographic location was found to confound the correlation: the strength of the relationship between poverty and AIDS was decreased to $r_{pb} = 0.15$ ($p < .001$) for the urban and $r_{pb} = 0.16$ ($p < .001$) for the rural sub-population. Findings suggest the importance of two sets of policies: those that address the potential upstream risk of poverty through economic interventions, and those that alleviate the impoverishing effects of AIDS illness for affected households.

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KEYWORDS
HIV/AIDS; poverty; structural equation modelling; poverty measurement; verbal autopsy

Introduction

Globally, 35 million people are living with HIV/AIDS (UNAIDS, 2013). Around 95% of them are localised in low- and middle-income countries, leading to claims that poverty and HIV/AIDS go hand in hand (Lachaud, 2007). However, the nature of this association has caused substantial debate in the literature over the last years (Butler, 2000; Hargreaves, Davey, & White, 2012).

Numerous studies have found a positive correlation between HIV/AIDS and poverty (Chakraborty, Firestone, & Bellows, 2013; Cluver, Orkin, Boyes, Gardner, & Meinck, 2011; Fenton, 2004; Madise, Zulu, & Ciera, 2007; Masanjala, 2007; Shisana, Rice, Zungu, & Zuma, 2010; UNAIDS, 2001). This correlation is likely to reflect both a hypothesised *upstream effect* of poverty on the likelihood of HIV infection as well as

CONTACT Janina Isabel Steinert janina.steinert@spi.ox.ac.uk; steinert.janina@gmail.com
[†]Present address: Warwick Medical School, University of Warwick, Coventry, UK
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a *downstream effect* of AIDS illness on households' poverty levels. The *upstream hypothesis* argues that impoverished people – largely women – are more likely to contract HIV due to increased necessity for transactional and age-disparate sexual relationships (Krishnan et al., 2008; Mojola, 2014; Wojcicki, 2005). Lack of education and limited HIV-related knowledge are other causal pathways (Bärnighausen, Hosegood, Timaeus, & Newell, 2007; deWalque, Nakiyingi-Miiro, Busingye, & Whitworth, 2005). Furthermore, chronic malnutrition, inadequate sanitation, and limited access to health infrastructure can increase susceptibility to HIV infection among people living in poverty (Poku, 2002; Solomon, 2012; Wojcicki, 2005). Vice versa, in accordance with the *downstream hypothesis*, studies suggest that AIDS illness can exacerbate the level of poverty in affected households/families (Bachmann & Booysen, 2003, 2006; Booysen & Arntz, 2003; Salinas & Haacker, 2006). The economic burden of an AIDS-unwell household member amplifies in direct costs such as medical expenses and costs for transport to health care centres (Bollinger & Stover, 1999; McIntyre, Thiede, Dahlgren, & Whitehead, 2006; Russell, 2004; Whiteside, 2002). Further indirect costs may include loss of income (particularly when the primary breadwinner is ill), diversion from productive labour to caring for the sick, and removal of children from school and thus the intergenerational transmission of poverty (Booysen, 2004; Loewenson, Hadingham, & Whiteside, 2009; Mahal, Canning, Odumosu, & Okonkwo, 2008; Poku, 2002).

Conversely, some studies suggest an opposite relationship: that household wealth rather than poverty is linked to HIV/AIDS (Chin, 2007; Fox, 2010, 2012; Fortson, 2008; Gillespie, Kadiyala, & Greener, 2007; Mishra et al., 2007, 2008; Parkhurst, 2010; Shelton, Cassell, & Adetunji, 2005). On a country level, higher prevalence rates are observed in the wealthier countries of Sub-Saharan Africa such as South Africa. On an individual level, relative wealth is associated with greater mobility and access to greater social networks, thus facilitating multiple sexual partnerships (Fox, 2012; Nattrass, 2009; Parkhurst, 2010).

In light of this debate, it is imperative to further investigate the relationship between AIDS illness and poverty. While great strides have been made in the global fight against HIV/AIDS and antiretroviral therapy has been rolled out in the developing world, it is essential to examine whether AIDS illness and poverty remain interlinked. The present paper therefore sets out to test whether there is a positive correlation between poverty and AIDS illness and whether the correlation holds across geographic locations within South Africa. Understanding of the question at hand is important for HIV prevention efforts as well as current considerations of 'HIV-sensitive social protection' provision (UNICEF, 2012).

Methods

Participants

This study used cross-sectional data that were collected by the authors for a study on child abuse, HIV/AIDS, and poverty. Data collection took place between 2009 and 2010 in the KwaZulu-Natal province in both rural (Manguzi/kwaNgwanase) and urban (Lamontville townships) communities, sampling 2477 households. Survey respondents were recruited through household stratified systematic random sampling. Census enumeration areas and designated tribal authority areas were identified via Geographical Information System and respondents were selected with door-to-door household sampling.

Households were eligible for participation in the study if they had a resident child/adolescent between the ages of 10 and 17. One child/adolescent per household was randomly selected and asked to identify a primary caregiver, defined as the person staying with and caring for the child – potentially biological parents, other family members, or non-relatives. KwaZulu-Natal records the highest HIV prevalence in South Africa (>35%) and more than two-thirds of its population are living on less than US2$ per day (Statistics South Africa, 2012; South African National Department of Health, 2011). Despite a claim for universal access to antiretroviral treatment (ART), the roll-out of ART in KwaZulu-Natal has been hindered by insufficiencies in health infrastructure, particularly so in rural areas (Michel & Matlakala, 2013; Ojikutu, 2007). In addition, food insecurity, lack of education, and the stigma associated with HIV/AIDS pose a serious threat to good ART adherence (Michel, Matlakala, English, Lessells, & Newell, 2013). AIDS symptomatology as well as mortality thus remain high.

Procedures

Trained and supervised local research assistants conducted 40-to-60-minute structured face-to-face interviews with standardised questionnaires. No incentives were provided other than refreshments and certificates of appreciation. Participation was voluntary. Ethical protocols were approved by the University of Oxford, University of KwaZulu-Natal, and the provincial Departments of Health and Education.

Measurements

AIDS illness

The analysis considered primary caregivers to be AIDS-unwell if they (1) indicated use of antiretrovirals, (2) had a CD4 count <200 cells/μL, or (3) met a conservative threshold of three or more *current* AIDS-related symptoms from the adapted verbal autopsy (VA) checklist, such as severe weight loss, oral candidiasis, or Kaposi's sarcoma (see Table A in supplemental data). The VA method was developed by Lopman et al. (2006) for post-mortem classification of AIDS-associated deaths in areas with HIV prevalence rates above 20%. Recent studies conducted in South Africa have validated the VA with 89% sensitivity, 93% specificity, and a positive prediction rate of 76% (Hosegood, Vanneste, & Timaeus, 2004; Kahn, Tollman, Garenne, & Gear, 2000). There has been an ongoing debate on when to classify a person as having AIDS, particularly in the light of treatment and recovery from severe illness. However, given that both AIDS illness as well as being on ART likely have implications for poverty, this paper uses the term 'AIDS-unwell' to refer to both current AIDS illness as well as a history of AIDS (i.e. a CD4 count of <200 cells/μL) resulting in ART initiation. While the VA method was designed to reduce the stigmatisation and shame that are associated with AIDS illness (Kalichman & Simbayi, 2003), it does not allow for identifying asymptomatic HIV-positive individuals.

Poverty

Conventional approaches to the measurement of poverty that rely on income or expenditure data can have limitations in low-income contexts. Income data are highly susceptible to measurement errors through seasonal fluctuations in earnings and informal borrowing

mechanisms (Moser & Felton, 2007; Sahn & Stifel, 2003). Collecting expenditure/consumption data can be time-consuming and potentially subject to recall bias (Bérenger, Deutsch, & Silber, 2013; Klasen, 2000; Sahn & Stifel, 2003). Finally, it may be valuable to capture the multidimensional character of poverty (Batana, 2013; Bérenger et al., 2013; OPHI, 2013). This study thus constructs a poverty scale that is based on the various household-level deprivations (Alkire & Foster, 2011; Carter & Barrett, 2006; Filmer & Scott, 2012; Harttgen & Vollmer, 2013; Moser & Felton, 2007; Wright & Noble, 2007). The poverty indicators presented in Table 1 were adopted from the South African *Demographic and Health Survey* and draw on previous work on composite poverty measurements (see Filmer & Pritchett, 2001; Sahn & Stifel, 2003). While we use the term poverty throughout this paper, the constructed measurement is likely to capture other related concepts and terms such as household economic well-being or material and human deprivation.

Analysis

In the first step, traditional exploratory factor analysis (EFA) was employed to explore which indicators from Table 1 can adequately measure poverty (see Acock, 2013). EFA was based on a polychoric correlation matrix to accommodate the binary or ordinal nature of the indicators (Holgado-Tello, Chacón-Moscoso, Barbero-García, & Vila-Abad, 2010). Scree plots were inspected for choosing principal components. Following Costello and Osborne (2005), a factor loading of 0.3 and above was deemed the minimum criterion for an item.

Subsequently, structural equation modelling (SEM) was introduced to estimate the point–biserial correlation between poverty and HIV/AIDS. Maximum likelihood estimators were used to fit the suggested models (Acock, 2013; StataCorp, 2013).

Following this, control variables were added to the model: *sex* and *age of the primary caregiver*, *urban/rural residency*. In addition, the analysis accounted for the *number of adults living in the household* (aged between 25 and 49 years) which may be linked to a family's potential for income generation as well as shared caregiving. Lastly, a binary variable as of whether the primary caregiver was receiving a *disability grant* at the time of measurement was added with the hypothesis that access to grants might alleviate the economic burden of AIDS illness for households. While families in South Africa may have access to a variety of

Table 1. Poverty indicators used for the analysis.

Housing quality	Asset ownership	Human capital
• Source of water • Safe drinking water • Electricity • Cooking fuel • Heating fuel • Lighting • Toilet facilities • Dwelling type • Wall type • Floor type • Number of rooms/ overcrowding	• Transport (bicycle, motorcycle/car) • Refrigerator • Washing machine • TV • Computer • Telephone • Radio • Food/hunger • Meat once a week • Livestock (horse, donkey, cattle, sheep)	• Education (of primary caregiver) • Employment (of any household member) • Schooling (of any household member)

welfare grants, eligibility for the disability grant is defined through physical/mental impairment and thus can be received by some AIDS-unwell individuals (SASSA, 2010).

Lastly, a multiple-group comparison was performed in order to examine whether correlation estimates differ for specific subgroups. Focus was placed on urban/rural residency which was previously found to be a potential confounder in the relationship between poverty and HIV/AIDS (Bachmann & Booysen, 2003; Fox, 2010, 2012; Wojcicki, 2005). For this analysis, the model with the least constraints (configural invariance) was chosen to allow differential factor loadings for individual poverty indicators across areas (see Steenkamp & Baumgartner, 1998). In so doing, we seek to build more adequate poverty measures for the specific population of interest.

Results

Sociodemographic characteristics of the population sample are summarised in Table 2. Across all 2477 households, 27.4% of the interviewed caregivers were identified as AIDS-unwell according to the adapted VA method. For all indicators, ownership or achievement was higher in households with healthy primary caregivers, significantly for most items (see Figure 1).

EFA

EFA of the poverty indicators showed five factors (see Table B in supplemental data) with Eigenvalues greater than 1 (see Kaiser, 1974) and the first factor explaining 44.7% of the variance (see Figure 2). However, after varimax rotation, items on each factor failed to correspond meaningfully to any putative dimensions of poverty such as asset ownership, housing quality, or human capital. We therefore selected a single-factor solution (Table 3). In addition, EFA was displayed for the urban and rural

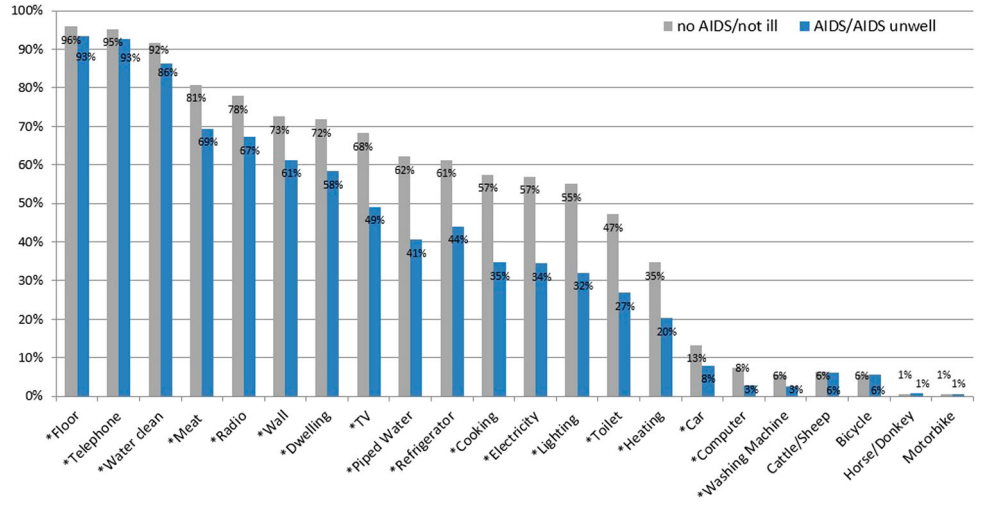

Figure 1. Binary Poverty Indicators by AIDS status of the primary caregiver.
Note: items marked with * show significant differences between households with AIDS-unwell and households with 'healthy' caregivers.

Table 2. Sample characteristics.

Binary/categorical variables	Complete sample $n = 2477$ *n* (%)	No AIDS illness $n = 1798$ (72.6%) *n* (%)	AIDS illness $n = 679$ (27.4%) *n* (%)	Difference *p*-value
On antiretroviral therapy	272 (11.0%)	0 (0%)	272 (40.1%)	
Residency				
Rural	1279 (51.7%)	825 (45.9%)	454 (66.9%)	$p < .001$
Urban	1198 (48.3%)	973 (54.1%)	225 (33.1%)	
Gender				
Female	2199 (88.8%)	1597 (88.9%)	602 (88.7%)	n.s
Male	278 (11.2)	201 (11.1%)	77 (11.3%)	
Population group				
African/Black	2473 (99.9%)	1795 (99.8%)	678 (99.9%)	n.s.
Coloured	3 (0.1%)	2 (0.1%)	1 (0.1%)	
White	1 (<0.1%)	1 (<0.1%)		
Education				
No schooling	493 (20.1%)	315 (17.6%)	178 (26.5%)	$p < .001$
Primary	661 (26.9%)	447 (25.0%)	214 (31.8%)	
Secondary	871 (35.4%)	657 (36.8%)	214 (31.8%)	
Matric	407 (16.5%)	343 (19.2%)	64 (9.5%)	
University	28 (1.1%)	25 (1.4%)	3 (0.4%)	
Employment				
Permanent job	304 (12.4%)	246 (13.8%)	58 (8.7%)	$p < .001$
Temporary job	351 (14.3%)	264 (14.8%)	87 (13.0%)	
Unemployed	1794 (73.3%)	1271 (71.4%)	523 (78.3%)	
Main source of income				
Salaries and/or wages	868 (35.1%)	710 (39.6%)	158 (23.3%)	$p < .001$
Remittances	61(2.5%)	48 (2.7%)	13 (1.9%)	
Welfare grants[a]	1255 (50.7%)	835 (46.5%)	420 (61.9%)	
Sales of farm products/services	84 (3.4%)	58 (3.2%)	26 (3.8%)	
No income	94 (3.8%)	66 (3.7%)	28 (4.1%)	
Other	112 (4.5%)	78 (4.3%)	34 (5%)	
Disability grant				
Household receipt of grant	160 (6.5%)	90 (5.0%)	70 (10.3%)	$p < .001$
Continuous variables	*M* (SD)	*M* (SD)	*M* (SD)	
Number of AIDS-related symptoms	1.39 (1.90)	0 (0)	3.75 (2.04)	
Caregiver age	44.22 (13.88)	44.92 (14.60)	42.33 (11.57)	$p < .001$
Household size	6 (2.67)	6.04 (2.71)	5.88 (2.55)	n.s.
Number of adults (25–49 years)	2.07 (1.17)	2.14 (1.20)	1.90 (1.05)	$p < .001$
Children not in school (average)	0.79 (1.46)	0.77 (1.47)	0.84 (1.45)	n.s.
Children going to school (average)	2.34 (1.31)	2.41 (1.34)	2.31 (1.30)	n.s.

Note: n.s. = not significant, missing values for education, employment, main source of income.

[a]Including: Child Support Grant for the alleviation of child poverty, Foster Care Grant, Care Dependency Grant, Old Age Pension, and Government Housing Subsidy.

Pearson's chi-square test was applied to test differences between households with and without AIDS-unwell caregivers for binary/ordinal outcome variables, and an independent *t*-test was performed for continuous outcome variables.

sample separately. As results imply some differences in factor loadings between locations, we only removed items where loadings were below 0.3 in both urban and rural locations.

Structural equation model

Goodness of fit of the original poverty measurement model proved low. Therefore, modification indices were inspected and errors for some item pairs were correlated accordingly (see Table C in supplemental data).

The above procedure generated a continuous poverty scale centred around zero (standardised scale: mean −0.001, 95% CI [−0.007, 0.004], min −0.17, max 0.16), whereby

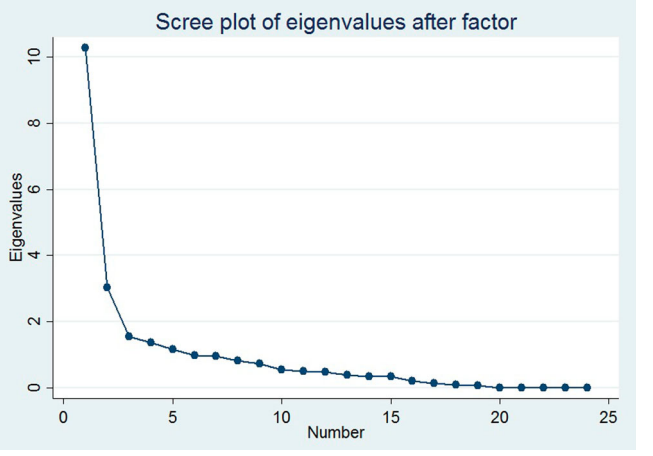

Figure 2. Scree plot: EFA.

larger scale scores denote higher levels of poverty (or higher levels of human and material deprivation).

Table 4 summarises the results from SEM analyses. The point–biserial correlation was $r_{pb} = 0.22$ ($p < .001$), implying a substantial association between poverty and AIDS illness. Covariates were introduced subsequently, but the correlation coefficient remained virtually unchanged. As depicted in Figure 3, households with AIDS-unwell primary caregivers were ranked on average as poorer than those with 'healthy' primary caregivers. A

Table 3. Summary of single-factor EFA (by location).

Item	Full sample ($N = 2352$)	Rural sample ($n = 1212$)	Urban sample ($n = 1140$)
Hunger	0.25	0.36	0.21
Refrigerator	−0.74	−0.59	−0.64
Phone	−0.36	−0.15	−0.18
Computer	−0.64	−0.20	−0.24
Transport	−0.36	−0.44	−0.28
Meat	−0.63	−0.36	−0.25
TV	−0.87	−0.55	−0.68
Radio	−0.65	−0.36	−0.44
Drinking source	−0.85	−0.31	−0.58
Safe water	−0.54	−0.01	−0.13
Washing machine	−0.07	−0.11	−0.22
Electricity	−0.74	−0.58	−0.72
Cooking	−0.94	−0.54	−0.16
Heating	−0.91	−0.39	−0.30
Lighting	−0.85	−0.61	−0.68
Toilet	−0.93	−0.24	−0.41
Floor	−0.46	−0.25	−0.20
Wall	−0.46	−0.54	−0.68
Dwelling	−0.55	−0.55	−0.66
Overcrowding	0.07	0.30	0.02
Livestock	0.28	−0.14	−0.07
Education	−0.67	−0.36	−0.21
Employment	−0.32	−0.25	−0.10
Schooling	−0.22	−0.06	−0.01
Eigenvalues	6.47	3.56	4.01
% of variance	75.6%	67.5%	60.8%
α	0.86	0.70	0.72

standardised-mean difference was calculated and yielded a *Cohen's d* of 0.52 (95% CI [0.43, 0.61]). In a similar vein, the odds of being identified as AIDS-unwell according to the VA method were 1.73 times higher (SE = 0.086) with a one-unit increase on the poverty scale.

Receipt of the disability grant was more prevalent in households with an AIDS-unwell caregiver and the level of poverty was significantly and negatively correlated with access to the disability grant. Looking at households with AIDS-unwell caregivers in specific, a *post hoc t*-test revealed that households that received the grant had a significantly lower average score on the standardised poverty scale, $t(654) = 3.67$, $p < .01$. The mean score on the composite poverty scale was 0.03 (95% CI [−0.003; 0.05]) in AIDS-affected households receiving the grant in comparison to a mean score of 0.06 (95% CI [0.05; 0.07]) in AIDS-affected households not receiving the grant, thus indicating a higher level of poverty in the latter.

The analysis revealed a substantial correlation between poverty and rural location ($r = 0.97$, $p < .001$) and points to a potential risk of multicollinearity. It is therefore crucial to proceed with estimating the relationship between poverty and AIDS for urban/rural subgroups separately in order to filter out the confounding effects of residency.

Multiple-group comparison

Table 5 presents the results from multiple-group comparisons in SEM, stratifying the model by urban and rural location. Most importantly, the correlation between poverty and AIDS illness was diminished. Coefficients remained positive and significant ($p < .001$), but were only $r_{pb} = 0.15$ for the urban and $r_{pb} = 0.16$ for the rural sub-population. The model was defined to allow for differential factor loadings for individual poverty indicators between rural and urban datasets. As the results show, some factor loadings differed substantially between locations. This finding likely indicates that the experience of poverty differs between urban and rural households and that the importance of specific poverty items varies across locations. As a robustness check, two fully separate models were run, stratified by urban and rural location, but differences in results were negligibly minor.

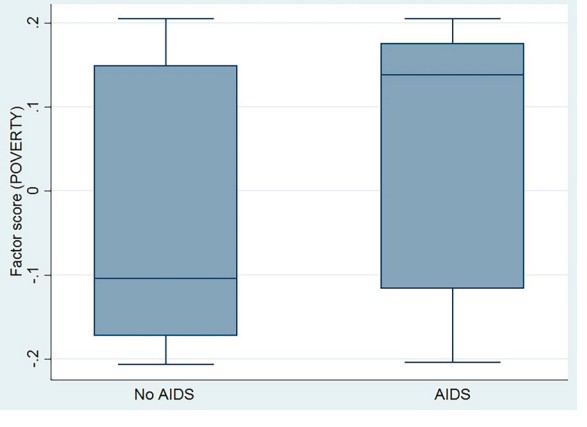

Figure 3. Boxplots: poverty by AIDS status of the primary caregiver.

Table 4. Final SEM results for the effect of AIDS illness on poverty.

	AIDS illness and poverty
Structural model	
Correlation of AIDS illness and poverty	$r_{pb} = 0.22^{***}$ (0.020)
Measurement model	
Hunger	0.16***
Meat	−0.36***
Computer	−0.20***
TV	−0.61***
Phone	−0.10***
Radio	−0.37***
Refrigerator	−0.65***
Drinking source	−0.67***
Safe water	−0.28***
Washing machine	−0.24***
Electricity	−0.89***
Cooking	−0.95***
Heating	−0.69***
Lighting	−0.92***
Toilet	−0.85***
Floor	−0.11***
Wall	−0.13***
Dwelling	−0.21***
Overcrowding	−0.04*
Transport	−0.06***
Education	−0.59***
Employment	−0.19***
Covariances	
AIDS illness with gender	−0.00
AIDS illness with age	−0.08***
AIDS illness with grant	0.10***
AIDS illness with rural	0.19***
AIDS illness with the number of adults	−0.09***
Poverty with gender	0.05*
Poverty with age	−0.07**
Poverty with grant	−0.05*
Poverty with rural	0.96***
Poverty with number of adults	−0.20***
Error × meat with error × hunger	−0.26***
Error × electricity with error × lighting	0.67***
Error × floor with error × dwelling	0.06***
Error × wall with error × dwelling	0.73***
Error × education with error × employment	0.15**
Goodness of fit	
χ^2	4820.829***
CFI	0.85
RMSEA	0.08
SRMR	0.07
N	2357

Note: Standard errors in parentheses.
*$p < .05$.
**$p < .01$.
***$p < .001$.

Discussion

The present analysis found evidence of a significant and positive relationship between poverty and HIV/AIDS on a household level, in contrast to claims that wealth is a predictor of HIV in Sub-Saharan African countries. It is important to highlight that the sample of this study was drawn from economically deprived communities and was thus

Table 5. Multiple-group SEM for urban and rural sub-populations.

	Urban ($N = 1144$)		Rural ($N = 1212$)	
	Standardised	Unstandardised	Standardised	Unstandardised
Structural model				
Correlation of AIDS illness and poverty	$r_{pb} = 0.15$***	$B = 0.01$***	$r_{pb} = 0.16$***	$B = 0.02$***
Measurement model				
Hunger	0.21***	1 (fixed)	0.36***	1 (fixed)
Meat	−0.26***	−0.44***	−0.34***	−0.52***
Computer	−0.20***	−0.35***	−0.21***	−0.10***
TV	−0.76***	−1.37***	−0.57***	−0.91***
Phone	−0.22***	−0.24***	−0.15***	−0.13***
Radio	−0.48***	−0.90***	−0.37***	−0.59***
Refrigerator	−0.71***	−1.47***	−0.61***	−0.91***
Drinking source	−0.58***	−1.11***	−0.32***	−0.46***
Safe water	−0.14***	−0.10***	−0.02	−0.03
Washing machine	−0.18***	−0.32***	−0.10***	−0.02***
Electricity	−0.65***	−0.86***	−0.52***	−0.50***
Cooking	−0.16***	−0.08***	−0.54***	−0.42***
Heating	−0.29***	−0.84***	−0.40***	−0.17***
Lighting	−0.60***	−0.83***	−0.55***	−0.44***
Toilet	−0.32***	−0.68***	−0.24***	−0.11***
Floor	−0.17***	−0.16***	−0.23***	−0.18***
Wall	−0.55***	−1.45***	−0.42***	−0.63***
Dwelling	−0.52***	−1.33***	−0.44***	−0.67***
Education	−0.18***	−0.79***	−0.38***	−1.15***
Employment	−0.09***	−0.41***	−0.24***	−0.46***
Overcrowding	−0.01	−0.35	−0.28***	−1.26***
Transport	−0.26***	−0.51***	−0.46***	−0.56***
Covariances				
Error × meat with error × hunger	−0.16***	−0.04***	−0.22***	−0.08***
Error × electricity with error × lighting	0.83***	0.03***	0.58***	0.03***
Error × floor with error × dwelling	0.04	0.01	0.06*	0.01*
Error × wall with error × dwelling	0.69***	0.10***	0.64***	0.12***
Error × education with error × employment	0.19***	0.11***	0.07*	0.03*
Goodness of fit				
χ^2	2721.5***			
CFI	0.80			
RMSEA	0.07			
SRMR	0.06			

*$p < .05$.
**$p < .01$.
***$p < .001$.
The model was fitted under the assumption of configural invariance.

impoverished *per se*. Yet, by adopting a wider conceptualisation of household poverty (that goes beyond household income), this empirical analysis can provide a nuanced understanding of the links between AIDS unwellness and experienced economic deprivation. The strength of the association was considerably reduced when accounting for urban/rural residency in multiple-group comparisons. That is, the initial correlation between poverty and AIDS was likely inflated both by the strong association between rural residency and the composite poverty measurement as well as by the link between rural residency and higher AIDS rates. Failure to account for rural and urban household status would thus over-estimate effect sizes. Notwithstanding, the correlation coefficient in the current study remained positive and significant for both subgroups. Therefore, the findings suggest that poverty and HIV/AIDS are interlinked, but concur with wider literature suggesting that the association is multi-faceted and contextual and that other factors such as labour migration, religion, and the historic legacy of a country can alter this association

(Auvert et al., 2001; Gizelis, 2009; Kalichman et al., 2006; Weiss & McMichael, 2004). Likewise, household poverty is driven by multiple factors including rural underdevelopment (Adato, Carter, & May, 2006; Woolard & Klasen, 2004).

Some tentative hypotheses can be formulated based on the above results. A higher number of adult household members were significantly associated with a lower level of poverty and a reduced prevalence of AIDS-unwell caregivers. Hence, single-headed households might be less resilient to AIDS-induced economic shocks as no other adult in the household can guarantee income generation and caregiving.

Further, the majority of AIDS-unwell caregiver in this sample indicated government grants as the main source of income of the household. This is in line with previous studies showing that income losses resulting from AIDS illness are partly substituted with welfare payments in countries that provide them (see Murtin & Marzo, 2013; Raniga & Simpson, 2011; Schatz, Madhavan, & Williams, 2010; Tladi, 2006). For instance, qualitative case studies in KwaZulu-Natal have shown that receipt of disability grants did contribute significantly to securing the basic needs of AIDS-infected adults (Knight, Hosegood, & Timæus, 2013). In a similar vein, a quantitative analysis of households in the Free State province has found that receipt of different grants could contribute between 10% and 60% to the total poverty reduction in AIDS-affected households (Booysen & van der Berg, 2005). *Post hoc t*-tests in the present analysis suggested that the disability grant might alleviate the impoverishing effects of AIDS illness. However, this finding must be interpreted cautiously as the analysis was based on cross-sectional data and recipient households could conceivably differ from non-recipient households in other, unmeasured aspects. Further research is required to explore associations with governmental grants (such as the disability grant, old age pension, and foster care grant) more thoroughly by using longitudinal data and controlling effectively for potential determinants of grant receipt/eligibility. Furthermore – although HIV/AIDS is potentially one of the criteria that translate into grant eligibility – only 10% of all AIDS-unwell caregivers in this sample receive the disability grant, suggesting that state-funded social security for AIDS-affected families remains deficient.

In contrast to prior studies (Dyson, 2003; Gillespie et al., 2007), AIDS illness was more prevalent in the rural than in the urban sample. It is conceivable that rates of AIDS sickness are higher in rural areas due to greater distance from clinics and health care centres and poor public transport. That is, there might be a shift in the HIV/AIDS epidemic moving from higher infection risks in urban centres to a higher risk for non-adherence and thus AIDS illness in rural communities. It is further conceivable that higher AIDS rates in rural areas are related to labour migrants who became infected with HIV/AIDS in urban centres and are returning home to be cared for (Clark, Collinson, Kahn, Drullinger, & Tollman, 2007; Lurie et al., 2003; Welaga et al., 2009). Yet, the present dataset did not include information on migrancy status of respondents and thus did not allow us to empirically examine the above arguments.

Several limitations of the current analysis are noteworthy. First, the cross-sectional study design makes it difficult to distinguish potential causes from effects and disentangle upstream and downstream effects as well as to assess the alleviating long-term impact of social security systems. Further work with longitudinal data is thus required.

The second limitation is the absence of information on the HIV status of household members other than the primary caregiver. For instance, because almost 90% of survey

respondents were female, detailed information on males – potentially primary breadwinners for some households – was lacking (see Masanjala, 2007; Poku, 2002; Russell, 2004). It is conceivable that the impoverishing effect of the disease becomes more pronounced when several household members suffer from HIV/AIDS, as the increased demand of caring would absorb more labour from income-generating activities. However, HIV/AIDS clusters within families and households (Poku, 2002; Whiteside, 2002) and it may be assumed that the primary caregiver's HIV status is somewhat indicative of a household's overall HIV-related vulnerability.

In summary, the findings of this study support evidence that suggests a positive relationship between poverty and HIV/AIDS. Although the magnitude of the correlation between poverty and AIDS illness was reduced when accounting for urban/rural residency, it should still be considered as 'socially important' (see Hemphill, 2003). With regard to the economic repercussions of AIDS illness, welfare grants have the potential to mitigate the detrimental downstream impact of the disease on poverty. Given that only 10% of households with AIDS-unwell caregivers in the current sample had access to the disability grant, it is important to consider means of enhancing access to welfare for those in need.

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References

Acock, A. C. (2013). *Discovering structural equation modeling using stata*. College Station, TX: StataCorp LP.

Adato, M., Carter, M. R., & May, J. (2006). Exploring poverty traps and social exclusion in South Africa using qualitative and quantitative data. *Journal of Development Studies*, *42*(2), 226–247. doi:10.1080/00220380500405345

Alkire, S., & Foster, J. (2011). Counting and multidimensional poverty measurement. *Journal of Public Economics*, *95*(7), 476–487. doi:10.1016/j.jpubeco.2010.11.006

Auvert, B., Buvé, A., Ferry, B., Caraël, M., Morison, L., Lagarde, E., … Akam, E. (2001). Ecological and individual level analysis of risk factors for HIV infection in four urban populations in Sub-Saharan Africa with different levels of HIV infection. *AIDS*, *15*, 15–30.

Bachmann, M. O., & Booysen, F. L. R. (2003). Health and economic impact of HIV/AIDS on South African households: A cohort study. *BMC Public Health*, *3*(1), 14. doi:10.1186/1471-2458-3-14

Bachmann, M. O., & Booysen, F. L. R. (2006). Economic causes and effects of AIDS in South African households. *AIDS*, *20*(14), 1861–1867. doi:10.1097/01.aids.0000244205.03382.84

Bärnighausen, T., Hosegood, V., Timaeus, I. M., & Newell, M.-L. (2007). The socioeconomic determinants of HIV incidence: Evidence from a longitudinal, population-based study in rural South Africa. *AIDS*, *21*(7), 29–38. doi:10.1097/01.aids.0000300533.59483.95

Batana, Y. M. (2013). Multidimensional measurement of poverty among women in Sub-Saharan Africa. *Social Indicators Research*, *112*(2), 337–362. doi:10.1007/s11205-013-0251-9

Bérenger, V., Deutsch, J., & Silber, J. (2013). Durable goods, access to services and the derivation of an asset index: Comparing two methodologies and three countries. *Economic Modelling*, *35*(3), 881–891. doi:10.1016/j.econmod.2013.02.042

Bollinger, L., & Stover, J. (1999). *The economic impact of AIDS in South Africa*. The POLICY Project – The Futures Group International, Research Triangle Institute, Centre for Development and Population Activities Funded by USAID.

Booysen, F. L. R. (2004). Income and poverty dynamics in HIV/AIDS-affected households in the Free State province of South Africa. *South African Journal of Economics*, *72*(3), 522–545. doi:10.1111/j.1813-6982.2004.tb00124.x

Booysen, F. L. R., & Arntz, T. (2003). The methodology of HIV/AIDS impact studies: A review of current practices. *Social Science & Medicine*, *56*(12), 2391–2405. doi:10.1016/S0277-9536(02)00243-5

Booysen, F. L. R., & van der Berg, S. (2005). The role of social grants in mitigating socio-economic impact of HIV/AIDS in two Free State communities. *South African Journal of Economics*, *73*(1), 545–563. doi:10.1111/j.1813-6982.2005.00038.x

Butler, C. (2000). HIV and AIDS, poverty, and causation. *The Lancet*, *356*(9239), 1445–1446. doi:10.1016/S0140-6736(05)74091-5

Carter, M. R., & Barrett, C. (2006). The economics of poverty traps and persistent poverty: An asset-based approach. *Journal of Development Studies*, *42*(2), 178–199. doi:10.1080/00220380500405261

Chakraborty, N. M., Firestone, R., & Bellows, N. (2013). Equity monitoring for social marketing: Use of wealth quintiles and the concentration index for decision making in HIV prevention, family planning, and malaria programs. *BMC Public Health*, *13*(2), 6. doi:10.1186/1471-2458-13-S2-S6

Chin, J. (2007). *The AIDS pandemic: The collision of epidemiology with political correctness*. London: Radcliffe Publishing.

Clark, S. J., Collinson, M. A., Kahn, K., Drullinger, K., & Tollman, S. M. (2007). Returning home to die: Circular labour migration and mortality in South Africa. *Scandinavian Journal of Public Health*, *69*(Supplement), 35–44. doi:10.1080/14034950701355619

Cluver, L., Orkin, M., Boyes, M., Gardner, F., & Meinck, F. (2011). Transactional sex amongst AIDS-orphaned and AIDS-affected adolescents predicted by abuse and extreme poverty. *Journal of Acquired Immune Deficiency Syndromes*, *58*(3), 336–343. doi:10.1097/QAI.0b013e31822f0d82

Costello, A. B., & Osborne, J. W. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment Research & Evaluation*, *10*(7), 173–178.

Dyson, T. (2003). HIV/AIDS and urbanization. *Population and Development Review*, *29*(3), 427–442. doi:10.1111/j.1728-4457.2003.00427.x

Fenton, L. (2004). Preventing HIV/AIDS through poverty reduction: The only sustainable solution? *The Lancet*, *364*(9440), 1186–1187. doi:10.1016/S0140-6736(04)17109-2

Filmer, D., & Pritchett, L. H. (2001). Estimating wealth effects without expenditure data – or tears: An application to educational enrollments in states of India. *Demography*, *38*(1), 115–132. doi:10.1353/dem.2001.0003

Filmer, D., & Scott, K. (2012). Assessing asset indices. *Demography*, *49*(1), 359–392. doi:10.1007/s13524-011-0077-5

Fortson, J. G. (2008). The gradient in Sub-Saharan Africa: Socioeconomic status and HIV/AIDS. *Demography*, *45*(2), 303–322. doi:10.1353/dem.0.0006

Fox, A. M. (2010). The social determinants of HIV serostatus in Sub-Saharan Africa: An inverse relationship between poverty and HIV? *Public Health Reports*, *125*(4), 16–24.

Fox, A. M. (2012). The HIV-poverty thesis re-examined: Poverty, wealth or inequality as a social determinant of HIV infection in Sub-Saharan Africa? *Journal of Biosocial Science*, *44*(4), 459–480. doi:10.1017/S0021932011000745

Gillespie, S., Kadiyala, S., & Greener, R. (2007). Is poverty or wealth driving HIV transmission? *AIDS*, *21*(7), 5–16. doi:10.1097/01.aids.0000300531.74730.72

Gizelis, T.-I. (2009). Wealth alone does not buy health: Political capacity, democracy, and the spread of AIDS. *Political Geography*, *28*(2), 121–131. doi:10.1016/j.polgeo.2009.01.005

Hargreaves, J., Davey, C., & White, R. (2012). Does the "inverse equity hypothesis" explain how both poverty and wealth can be associated with HIV prevalence in Sub-Saharan Africa? *Journal of the International AIDS Society*, *15*, 175–176. doi:10.1136/jech-2012-201876

Harttgen, K., & Vollmer, S. (2013). Using an asset index to simulate household income. *Economics Letters*, *121*(2), 257–262. doi:10.1016/j.econlet.2013.08.014

Hemphill, J. F. (2003). Interpreting the magnitudes of correlation coefficients. *American Psychologist*, *58*(1), 78–79. doi:10.1037/0003-066X.58.1.78

Holgado-Tello, F. P., Chacón-Moscoso, S., Barbero-García, I., & Vila-Abad, E. (2010). Polychoric versus Pearson correlations in exploratory and confirmatory factor analysis of ordinal variables. *Quality & Quantity*, *44*(1), 153–166. doi:10.1007/s11135-008-9190-y

Hosegood, V., Vanneste, A.-M., & Timaeus, I. M. (2004). Levels and causes of adult mortality in rural South Africa: The impact of AIDS. *AIDS*, *18*(4), 663–671.

Kahn, K., Tollman, S., Garenne, M., & Gear, J. (2000). Validation and application of verbal autopsies in a rural area of South Africa. *Tropical Medicine and International Health*, *11*(5), 824–831. doi:10.1046/j.1365-3156.2000.00638.x

Kaiser, H. F. (1974). Index of factorial simplicity. *Psychometrika*, *39*(1), 31–36. doi:10.1007/BF02291575

Kalichman, S. C., & Simbayi, L. C. (2003). HIV testing attitudes, AIDS stigma, and voluntary HIV counselling and testing in a black township in Cape Town, South Africa. *Sexually Transmitted Infections*, *79*(6), 442–447. doi:10.1136/sti.79.6.442

Kalichman, S. C., Simbayi, L. C., Kagee, A., Toefy, Y., Jooste, S., Cain, D., & Cherry, C. (2006). Associations of poverty, substance use, and HIV transmission risk behaviors in three South African communities. *Social Science & Medicine*, *62*(7), 1641–1649. doi:10.1016/j.socscimed.2005.08.021

Klasen, S. (2000). Measuring poverty and deprivation in South Africa. *Review of Income and Wealth*, *46*(1), 33–58. doi:10.1111/j.1475-4991.2000.tb00390.x

Knight, L., Hosegood, V., & Timæus, I. M. (2013). The South African disability grant: Influence on HIV treatment outcomes and household well-being in KwaZulu-Natal. *Development Southern Africa*, *30*(1), 135–147. doi:10.1080/0376835X.2013.755767

Krishnan, S., Dunbar, M. S., Minnis, A. M., Medlin, C. A., Gerdts, C. E., & Padian, N. S. (2008). Poverty, gender inequities, and women's risk of human immunodeficiency virus/AIDS. *Reducing the Impact of Poverty on Health and Human Development: Scientific Approaches*, *1136*, 101–110. doi:10.1080/0376835X.2013.755767

Lachaud, J.-P. (2007). HIV prevalence and poverty in Africa: Micro-and macro-econometric evidences applied to Burkina Faso. *Journal of Health Economics*, *26*(3), 483–504. doi:10.1016/j.jhealeco.2006.10.007

Loewenson, R., Hadingham, J., & Whiteside, A. (2009). Household impacts of AIDS: Using a life course approach to identify effective, poverty-reducing interventions for prevention, treatment and care. *AIDS Care*, *21*(8), 1032–1041. doi:10.1080/09540120802626170

Lopman, B. A., Barnabas, R. V., Boerma, J. T., Chawira, G., Gaitskell, K., Harrop, T., & Nyamukapa, C. (2006). Creating and validating an algorithm to measure AIDS mortality in the adult population using verbal autopsy. *PLoS Medicine*, *3*(8), e312. doi:10.1371/journal.pmed.0030312

Lurie, M. N., Williams, B. G., Zuma, K., Mkaya-Mwamburi, D., Garnett, G. P., Sweat, M. D., … Karim, S. S. (2003). Who infects whom? HIV-1 concordance and discordance among migrant and non-migrant couples in South Africa. *AIDS*, *17*(15), 2245–2252.

Madise, N., Zulu, E., & Ciera, J. (2007). Is poverty a driver for risky sexual behaviour? Evidence from national surveys of adolescents in four African countries. *African Journal of Reproductive Health*, *11*(3), 83–98.

Mahal, A., Canning, D., Odumosu, K., & Okonkwo, P. (2008). Assessing the economic impact of HIV/AIDS on Nigerian households: A propensity score matching approach. *AIDS*, *22*(1), 95–101. doi:10.1097/01.aids.0000327629.62350.59

Masanjala, W. (2007). The poverty-HIV/AIDS nexus in Africa: A livelihood approach. *Social Science & Medicine*, *64*(5), 1032–1041. doi:10.1016/j.socscimed.2006.10.009

McIntyre, D., Thiede, M., Dahlgren, G., & Whitehead, M. (2006). What are the economic consequences for households of illness and of paying for health care in low- and middle-income country contexts? *Social Science & Medicine*, *62*(4), 858–865. doi:10.1016/j.socscimed.2005.07.001

Michel, J., Matlakala, C., English, R., Lessells, R., & Newell, M.-L. (2013). Collective patient behaviours derailing ART roll-out in KwaZulu-Natal: Perspectives of health care providers. *AIDS Research and Therapy*, *10*, 20. doi:10.1186/1742-6405-10-20

Michel, J., & Matlakala, M. C. (2013). The challenges experienced by nongovernmental organisations with regard to the roll-out of antiretroviral therapy in KwaZulu-Natal. *South African Family Practice*, *55*(3), 264–269. doi:10.1080/20786204.2013.10874348

Mishra, V., Bignami-Van Assche, S., Greener, R., Vaessen, M., Hong, R., Ghys, P. D., & Rutstein, S. (2007). HIV infection does not disproportionately affect the poorer in Sub-Saharan Africa. *AIDS*, *21*(7), 17–28. doi:10.1097/01.aids.0000300532.51860.2a

Mojola, S. A. (2014). *Love, money, and HIV: Becoming a modern African woman in the age of AIDS*. Oakland, CA: University of California Press.

Moser, C. O., & Felton, A. (2007). The construction of an asset index measuring asset accumulation in Ecuador. In T. Addison, D. Hulme, & R. Kanbu (Eds.), *Poverty dynamics. Interdisciplinary perspectives* (pp. 102–128). New York, NY: Oxford University Press.

Msisha, W. M., Kapiga, S. H., Earls, F., & Subramanian, S. V. (2008). Socioeconomic status and HIV seroprevalence in Tanzania: A counterintuitive relationship. *International Journal of Epidemiology*, *37*(6), 1297–1303. doi:10.1093/ije/dyn186

Murtin, F., & Marzo, F. (2013). HIV/AIDS and poverty in South Africa: A Bayesian estimation of selection models with correlated fixed-effects. *South African Journal of Economics*, *81*(1), 118–139. doi:10.1111/j.1813-6982.2012.01341.x

Nattrass, N. (2009). Poverty, sex and HIV. *AIDS and Behavior*, *13*(5), 833–840. doi:10.1007/s10461-009-9563-9

Ojikutu, B. (2007). The realities of antiretroviral therapy rollout: Overcoming challenges to successful programmatic implementation. *Journal of Infectious Diseases*, *196*(Suppl. 3), 445–448. doi:10.1086/521123

OPHI. (2013). *Oxford Poverty and Human Development Initiative – Multidimensional Poverty*. Retrieved 02/02/2014, from http://www.ophi.org.uk/research/multidimensional-poverty/

Parkhurst, J. O. (2010). Understanding the correlations between wealth, poverty and human immunodeficiency virus infection in African countries. *Bulletin of the World Health Organization*, *88*(7), 519–526. doi:10.2471/BLT.09.070185

Poku, N. K. (2002). Poverty, debt and Africa's HIV/AIDS crisis. *International Affairs*, *78*(3), 531–546. http://www.jstor.org/stable/3095889

Raniga, T., & Simpson, B. (2011). Poverty, HIV/AIDS and the old age pension in Bhambayi, Kwazulu-Natal, South Africa. *Development Southern Africa*, *28*(1), 75–85. doi:10.1080/0376835X.2011.545171

Russell, S. (2004). The economic burden of illness for households in developing countries: A review of studies focusing on malaria, tuberculosis, and human immunodeficiency virus/acquired immunodeficiency syndrome. *American Journal of Tropical Medicine and Hygiene*, *71*(2), 147–155. http://www.ajtmh.org/content/71/2_suppl/147

Sahn, D. E., & Stifel, D. (2003). Exploring alternative measures of welfare in the absence of expenditure data. *Review of Income and Wealth*, *49*(4), 463–489.

Salinas, G., & Haacker, M. (2006). HIV/AIDS: The impact on poverty and inequality. *IMF Working Paper, WP/06/126*, 1–24.

Schatz, E., Madhavan, S., & Williams, J. (2010). Female-headed households contending with HIV/AIDS-related hardship in rural South Africa. *Health & Place*, *17*, 598–605. doi:10.1016/j.healthplace.2010.12.017.

Shelton, J. D., Cassell, M. M., & Adetunji, J. (2005). Is poverty or wealth at the root of HIV? *Lancet*, *366*(9491), 1057–1058. doi:10.1016/S0140-6736(05)67401-6

Shisana, O., Rice, K., Zungu, N., & Zuma, K. (2010). Gender and poverty in South Africa in the era of HIV/AIDS: A quantitative study. *Journal of Women*, *19*(1), 39–46. doi:10.1089/jwh.2008.1200.

Solomon, H. (2012). *The relationship of BMI and household wealth status on HIV outcome among a sub-sample of women from the 2005 Ethiopian demographic & health survey* (Order No. 1548096, Yale University). (ProQuest Dissertations and Theses), 32. Retrieved 12/07/2014 from http://search.proquest.com/docview/1466611074?accountid = 13042.

South African National Department of Health. (2011). *National antenatal sentinel HIV & syphilis prevalence survey*. Retrieved 09/04/2014, from http://www.health-e.org.za/wp-content/uploads/2013/05/f0980fb517a7ce543a8bd5730e52333.pdf.

South African Social Security Agency (SASSA). (2010). *You and your grants 2010/11*. Pretoria: SASSA.

StataCorp. (2013). *Stata: Release 13. Statistical Software*. College Station, TX: StataCorp LP.

Statistics South Africa. (2012). *Poverty profile of South Africa: Application of the poverty lines on the LCS 2008*/2009. Retrieved July 26, 2014, from http://www.statssa.gov.za/publications/Report-03-10-03/Report-03-10-032009.pdf

Steenkamp, J.-B. E., & Baumgartner, H. (1998). Assessing measurement invariance in cross-national consumer research. *Journal of Consumer Research*, *25*(1), 78–107. doi:10.1086/209528

Tladi, L. S. (2006). Poverty and HIV/AIDS in South Africa: An empirical contribution. *Journal of Social Aspects of HIV/AIDS Research Alliance*, *3*(1), 369–381. doi:10.1080/17290376.2006.9724863

UNAIDS. (2001). *The global strategy framework on HIV/AIDS*. Geneva: Author.

UNAIDS. (2013). *Global Fact Sheet 2013*. Retrieved from December 17, 2013, http://www.unaids.org/en/media/unaids/contentassets/documents/epidemiology/2013/gr2013/20130923_FactSheet_Global_en.pdf

UNICEF. (2012). *HIV-sensitive social protection: State of the evidence 2012 in Sub-Saharan Africa*. Retrieved November 23, 2014, from http://epri.org.za/wp-content/uploads/2012/06/HIV-Sensitive-Social-Protection1.pdf

deWalque, D., Nakiyingi-Miiro, J. S., Busingye, J., & Whitworth, J. A. (2005). Changing association between schooling levels and HIV-1 infection over 11 years in a rural population cohort in south-west Uganda. *Tropical Medicine & International Health*, *10*(10), 993–1001. doi:10.1111/j.1365-3156.2005.01475.x

Weiss, R. A., & McMichael, A. J. (2004). Social and environmental risk factors in the emergence of infectious diseases. *Nature Medicine*, *10*, 70–76. doi:10.1038/nm1150

Welaga, P., Hosegood, V., Weiner, R., Hill, C., Herbst, K., & Newell, M.-L. (2009). Coming home to die? The association between migration and mortality in rural South Africa. *BMC Public Health*, *9*, 193. doi:10.1186/1471-2458-9-193

Whiteside, A. (2002). Poverty and HIV/AIDS in Africa. *Third World Quarterly*, *23*(2), 313–332. http://www.jstor.org/stable/3993503

Wojcicki, J. M. (2005). Socioeconomic status as a risk factor for HIV infection in women in East, Central and Southern Africa: A systematic review. *Journal of Biosocial Science*, *37*(1), 1–36. doi:10.1017/S0021932004006534.

Woolard, I., & Klasen, S. (2004). Determinants of income mobility and household poverty dynamics in South Africa. *Journal of Development Studies*, *41*(5), 865–897. doi:10.1080/00220380500145313

Wright, G., & Noble, M. (2007). *South African Index of Multiple Deprivation*. Center for the Analysis of South African Social Policy. Retrieved December 12, 2014, from http://www.casasp.ox.ac.uk/imd.html#SAIMD07_mun.