

HEALTH FACILITY CHOICE IN HIV- AND AIDS-AFFECTED
HOUSEHOLDS IN TWO SOUTH AFRICAN COMMUNITIES

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Abstract

This paper analysed differences in the choice of health-care facility by ill individuals in human immunodeficiency virus (HIV)- and acquired immune deficiency syndrome (AIDS)-affected households in the Free State province of South Africa. Secondary education, access to medical aid and household income were significant determinants of choice as were severity and type of illness, and type of health care required. Ill persons with HIV- and AIDS-related illnesses are significantly more likely to opt for public health care, although the strength of this preference declines as household income increases. Those with severe and particularly severe HIV- and AIDS-related illness, in turn, are significantly more likely to opt for private health care, especially at higher levels of income. The public health care sector therefore is likely to remain the backbone of health-care provision to those infected with and affected by HIV and AIDS, highlighting the need for equitable access to efficient, quality public health services.

JEL Classification: I11

Keywords: HIV, AIDS, health care, utilisation

1. INTRODUCTION

South Africa has a well-developed health-care system. Expenditure on health care is on par with that of many developed countries. In the late 1990s, total per capita health-care expenditure amounted to purchasing power parity US\$663, with public and private expenditure representing 3.7% and 5.1% of gross domestic product (GDP), respectively (United Nations Development Programme (UNDP), 2003:256). The availability of health-care personnel is relatively good compared with most other developing countries, with a ratio of 443 physicians per 100,000 population (UNDP, 2003). Public health-care is funded mainly from general taxation (94%), with user fees representing only 1% of public funding (Thomas *et al.*, 2000) in a system where primary health care is free. Private health care in turn is financed predominantly via medical schemes (73%) and out-of-pocket expenditure (23%) (Goudge *et al.*, 2001). Yet, the public/private divide in access to health care remains stark in this system, with public health care, for the most part, provided free, while private health care is costly. While those from more affluent households access private care, the poor rely mainly on public health delivery and are also more likely to opt for self-treatment (Makinen *et al.*, 2000; Booysen, 2003; Havemann

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and Van der Berg, 2003). The ratio of trained medical staff (general practitioners, GPs) per 100,000 population ranges from 380 (34) to 4,453 (2,050) in the public and private health-care sectors, respectively (Thomas *et al.*, 2000). Although public spending is regressive, the poor benefit less than proportionally from this subsidy (Castro-Leal *et al.*, 2000).

South Africa has one of the highest human immunodeficiency virus (HIV) prevalence rates in the world. Dorrington *et al.* (2006) put HIV prevalence in the adult population at 18.3% in mid-2006, which translates into an estimated 4.8 million adults between 15–49 years living with HIV. Those infected with HIV and suffering from acquired immune deficiency syndrome (AIDS) have access to palliative care, both in the private and public health-care system. Until recently, access to antiretroviral treatment (ART) was limited. By 2001, almost three quarters of options offered by private medical schemes in South Africa provided access to antiretroviral therapy, which covers 92% of beneficiaries of medical schemes (Stein *et al.*, 2002). Yet, only 16% of the population have medical aid coverage (Goudge *et al.*, 2001), which implies that the majority of infected persons have no access to ART. Since then, however, there has been a shift towards providing universal access to ART. In 2005, ART was added to the list of prescribed minimum benefits that all public hospitals and other designated service providers are required by law to provide, according to specified clinical protocols and criteria. These benefits must be covered by all benefit options offered by private medical schemes, while the use of monetary limits, levies and co-payments are prohibited for coverage of these minimum benefits (Harrison, 1998, 1999; Sait, 2001; Pillay *et al.*, 2002; Forman *et al.*, 2004).¹ Access to ART became a reality in the public health-care sector in 2003–2004. Public access, however, is not as yet universal and treatment is being phased in over a five-year period in the public health-care system (Department of Health, 2003). In the context of high HIV prevalence and a resultant high burden of HIV- and AIDS-related disease on a well-developed but highly inequitable health system, knowledge of health-care utilisation among ill individuals from HIV- and AIDS-affected households is crucial in advancing our knowledge about health-care provisioning to populations affected by the epidemic. In particular, one needs to understand how the infected and affected choose between public and private health-care facilities.²

¹ In respect to other HIV- and AIDS-related care and treatment options, the list of prescribed minimum benefits also includes HIV-associated disease and sexually transmitted diseases (STD) as well as comfort care and pain relief when death is imminent (Pearmain, 2000).

² We collected data on the type of health-care facility used rather than the specific care and treatment received by each ill individual. We are therefore not in a position to investigate the determinants of access to palliative care as opposed to ART. Following the announcement of the launch of a public sector ART programme in South Africa, and given that a number of the public health-care facilities where treatment would commence were located within our two study sites, we did include a specific question pertaining to access to ART by wave 6 of the study. Yet, only one ill person reportedly received antiretroviral treatment at the time, in this case, at a mining hospital. In fact, the ART programme in the Free State province only commenced after the completion of our study: the first patient in the province received treatment in June 2004. Thus, the focus here, as explained elsewhere, is on the determinants of health-care facility choice by ill individuals from HIV- and AIDS-affected households rather than on determinants of choices that pertain to specific types of care and treatment available to HIV-infected persons suffering from AIDS. For reasons noted earlier, our focus is on access to palliative care rather than to ART.

2. DATA

The household impact of HIV and AIDS was assessed by means of a cohort study of households affected by the disease. The survey was conducted during 2001–2004 in two local communities in the Free State province, one urban (Welkom) and one rural (QwaQwa), in which the HIV and AIDS epidemic is particularly rife. The two districts in which the study sites are situated, namely Lejweleputswa (Welkom) and Thabo Mofutsanyane (Qwaqwa), in 2000, faced an HIV prevalence rate among antenatal clinic attendees of 30.1% and 27.1%, respectively. The respective estimates reported for 2003 were 33.3% and 28.0% (Department of Health, 2004). According to the report entitled *Measuring Poverty* published in 2000, the larger Welkom magisterial district is the third richest in the Free State province, with a headcount poverty ratio of 0.34 and average monthly household expenditure of R2,364. The magisterial district of Witsieshoek, which is within the boundaries of the former Qwaqwa, is the poorest in the Free State province and also ranks among the poorest in the country. The headcount poverty ratio in this district is 0.69, while average monthly household expenditure amounts to R807 (Statistics South Africa, 2000). Households were defined in terms of the standard definition employed by Statistics South Africa in the 1995 October Household Survey, *i.e.* “a person or a group of persons who live together at least four nights a week at the same address, eat together and share resources” (Statistics South Africa, 1995:0317-E). A household survey was conducted using semi-structured, face-to-face interviews conducted by trained fieldworkers. Interviews were conducted with one key respondent only, namely the “person responsible for the daily organisation of the household, including household finances.” Six rounds of data collection were completed in May/June and November/December of 2001, in July/August and November/December of 2002 and in July/August 2003 and May/June 2004, respectively.

The results reported in this paper were based on an analysis of data for ill individuals from HIV- and AIDS-affected households. These include households sampled purposively at baseline via non-governmental organisations (NGOs) and other organisations involved in HIV and AIDS counselling and care that included at least one person suspected to be HIV-positive or suspected to have died from AIDS in the past six months. In addition, affected households include households from a comparison group sampled at baseline but that subsequent to or at baseline included ill individuals who suffered from HIV- and AIDS-related illnesses, notably HIV and AIDS, tuberculosis, STDs, pneumonia, bronchitis or meningitis. Admittedly, we face an identification problem here, given that the ill individuals were not tested to determine their HIV status. Thus, one may argue that the data cannot be employed to investigate determinants of health-care utilisation by HIV-infected persons. Because of the purposive sampling design and the relatively small sample size of our survey, moreover, the findings from this study cannot be generalised to South Africa as a whole. In fact, this constraint on the ability to generalise findings is a characteristic shared by the majority of studies into the household impact of HIV and AIDS (Booyesen and Arntz, 2003).

Nevertheless, we would argue that the results are characteristic of the health-care-seeking behaviour of ill persons from a large proportion of HIV- and AIDS-affected households in South Africa. Our reasons for arguing this are as follows. In the first instance, HIV infection is normally clustered within households (Barnett and Whiteside,

2002). This means that the presence in a household of one person with HIV- and AIDS-related disease makes it likely that other ill persons from the same household are also HIV-infected individuals, albeit that they may not have suffered from HIV- and AIDS-related illnesses at the time. Second, analysis indicates that a relatively large proportion of morbidity and mortality in affected households can be attributed to HIV and AIDS or related infectious diseases and opportunistic infections (Bachmann and Booysen, 2003, 2004). In terms of the data employed in this paper, 57.5% of the ill individuals in the subsample reported diagnosis related to HIV and AIDS, tuberculosis, STDs, pneumonia, bronchitis or meningitis. Finally, the households in our study, for the most part, share the socio-demographic and socio-economic characteristics of persons who, according to the only national HIV prevalence study ever conducted in South Africa, experience relatively high HIV infection rates.³ Thus, it is probable that these ill persons do originate from HIV- and AIDS-affected households and that the data can shed light on the health-care-seeking behaviour of HIV-infected individuals in South Africa, this despite the other limitations of these data.

The subsample of observations from the larger study employed in this paper included the health-care utilisation information for a total of 730 individuals from HIV- and AIDS-affected households that were reported as ill in at least one wave of the panel. We have data for one health-care visit per wave only, namely the last visit prior to the interview. Of these 730 ill individuals, 333 or 45.6% are from urban Welkom and 397 or 54.4% from rural QwaQwa. A relatively large proportion of these individuals were observed as ill once only, namely 224 individuals or 30.7% of the total sample. A total of 88 individuals were ill in two waves ($n = 176$), 36 in three waves ($n = 108$), 24 in four waves ($n = 96$), 12 in five waves ($n = 60$) and 11 in six waves ($n = 66$). The number of observations per period, respectively, is 211 (wave 1), 135 (wave 2), 100 (wave 3), 105 (wave 4), 94 (wave 5) and 85 (wave 6). The panel is an unbalanced panel, given that health-care utilisation information for the 395 observed individuals (395×6 waves = 2,370 observations) were missing in certain waves due to ill individuals not being ill, ill individuals having died subsequently, ill individuals joining households in the sample at a later stage or ill individuals having left their respective households in subsequent periods, as reported in Table 1. Descriptive statistics of variables are reported in Table A in the Appendix to this paper.

³ Shisana and Simbayi (2002) reported relatively higher HIV prevalence rates among Africans (12.9%), among females (12.8%), among people from the Free State province (14.9%), among those living in formal (12.1%) or informal (21.3%) urban dwellings, among adults aged 25 years or older (15.5%), among the poor (14%) and among those aged 15 years or older with only primary education (12.1%), some secondary education (14.9%), or grade 12 (15.3%) compared with persons from the general populations. The ill individuals in our subsample, apart from all living in the Free State province, were mainly Africans (89.5%), females (64.2%), those living in formal urban dwellings (82.9%) or informal urban dwellings (11.6%), adults aged 25 years or older (71.5%), the poor (42.7%) and those aged 15 years or older with only primary education (32.1%), some secondary education (38.9%), or grade 12 (14%). The "poor" here represents individuals who resided in households that did not have enough money or were often unable to afford basics as opposed to individuals from households with enough money to afford the most important items or extras (Shisana and Simbayi, 2002:54).

Table 1. Subsample of ill individuals from HIV- and AIDS-affected households

Status	Sample n (%)
Ill	730 (30.8)
Not ill	972 (41.0)
Recruited in subsequent wave	178 (7.5)
Left household in previous wave	248 (10.5)
Died in subsequent wave	242 (10.2)
Total	2,370 (100)

Note: Percentage totals may not add up due to rounding.

Table 2. Choice of health-care facility by ill individuals from HIV- and AIDS-affected households

Choice	Sample n (%)
No/self treatment	26 (3.6)
Public facility	568 (77.8)
Private facility	131 (18.0)
Traditional/naturalist	5 (0.7)
Total	730 (100.0)

Note: Percentage totals may not add up due to rounding.

3. METHOD

Individuals may have specific preferences for health and indirectly for health care. Demand for health care can be observed directly and quantified and therefore, serves as a useful proxy for health if we derive a reduced-form estimation of health-care facility choices by the individuals in our sample. Given that individual utility (U_i) can not be observed directly, the indirect utility (y_{ij}^*) associated with health-care alternative, j ($j = 1, 2, \text{etc.}$), is expressed as $y_{ij}^* = U(X, \beta)$, where X is the matrix of independent individual-, household- and community-specific variables for the entire sample ($I = 1, \dots, m$ individuals, $t = 1, \dots, n$ time periods) and β is a vector of coefficients. We model choice of health-care facility assuming a simple linear specification of the indirect utility function (adapted from Lindelow, 2002): $y_{ij}^* = \beta'X + \varepsilon_{it}$.

Potential sample selection problems arise given that y_{ij}^* is observed conditionally on an individual who seeks health care when ill. According to data from a nationally representative household survey conducted in South Africa in 1993, for example, 18% of ill household members opted for self-treatment (Havemann and Van der Berg, 2003: 10). The decision about which type of health-care facility to use is modelled typically as a nested multinomial logit model or a two-stage decision wherein the individual first chooses whether or not to seek medical treatment, and thereafter, decides on the type of health-care facility to use (Akin *et al.*, 1995; Chang and Trivedi, 2001; Collier *et al.*, 2002; Trivedi, 2002; Havemann and Van der Berg, 2003). In this survey, however, only 3.6% (26/730) of the individuals who fell ill chose not to seek health care (Table 2). This most likely is the result of our sampling design (Heckman, 1979): Since the sampling frame consists of individuals with access to home-based care from NGOs, the low proportion of households that did not seek treatment is not surprising (the severe illness experienced by HIV-infected persons, particularly when they are AIDS-symptomatic, may also explain the fact that a large proportion of ill persons seek treatment). Given that the proportion of individuals that did not seek treatment is not a significant proportion

of our sample, omitting these observations therefore should not introduce significant selection bias to our estimations.⁴

Owing to the sparseness of the data, choice of health-care facility has been aggregated into public and private health-care facilities (refer to Table 2). Thus, we estimate the probability of visiting private health-care facilities over public health-care facilities as a function of a host of individual and household-specific variables. Public facilities include government clinics and hospitals. Private health-care facilities include GPs, private hospitals, health-care services provided by employers and pharmacies. A logit model is first estimated for the data pooled across all six waves of the panel. The logit estimations are obtained for heteroscedastic robust standard errors (Butler and Moffit, 1982). A random effects logit model is then estimated using the panel data based on maximum likelihood estimation. The random effects logit model is specified as: $y_{ij}^* = \beta \mathbf{x}_{ij} + u_i + \varepsilon_{ij}$, where $u_i \sim IID(0, \sigma_u^2)$ is normally distributed and $\varepsilon_{ij} \sim IID(0, \sigma_\varepsilon^2)$ is logistically distributed such that ε_{ij} has mean zero and variance $\sigma_\varepsilon^2 = \pi^2/3$ independently of u_i ; (Wooldridge, 2002:482-484).⁵

The individual-level characteristics in the regression model (model 1) include gender, age, education and access to medical aid as well as health-specific determinants of demand for health care such as type of care (hospital-based vs. other care), severity of illness and type of illness (HIV- and AIDS-related vs. other illnesses). Severe cases of illness represent cases where the person had been ill for 30 days out of the past month, had not recovered from their illness, and was not able to perform daily tasks. HIV- and AIDS-related illnesses represent cases where the self-reported diagnosis was given as HIV and AIDS, STDs, tuberculosis, pneumonia, bronchitis or meningitis.⁶ In addition, we estimate a second model (model 2) in which we interact severity and type of illness to determine the nature of preferences for private over public health care for severe HIV- and AIDS-related

⁴ As a precautionary measure, we verified the absence of a sample selection problem by estimating a multinomial logit model with three categories (no treatment sought, public health-care sought, private health-care sought) as well as a Heckman two-stage selection model (with joint maximum likelihood estimation). These results, not included here, are available from the authors on request.

⁵ An advantage of using the random effects model over the fixed effects model is that the latter loses a degree of freedom for each observation (n), which typically is a problem if the sample size is relatively small. This loss of degrees of freedom is avoided when we assume u_i to be random (Baltagi, 2001:15). We were unable to estimate the fixed effect because of this loss in degrees of freedom as well as the lack of variation in the dependent variable over the six waves.

⁶ The number of cases of illness attributed specifically to HIV and AIDS was 30. This number was too small to allow a meaningful analysis of choice of health-care facility across the three types of illness: HIV- and AIDS-specific, other HIV- and AIDS-related and other illnesses, not to mention the interaction of severity of illness with each illness type. In fact, HIV- and AIDS-specific illnesses were not significantly more severe compared with other HIV- and AIDS-related illnesses, although HIV- and AIDS-related illnesses in general were significantly more severe compared with other illnesses: 23.8% vs. 16.3% ($p < 0.05$). Moreover, in the absence of HIV testing, such distinction between HIV- and AIDS-specific as opposed to other HIV- and AIDS-related illnesses based on self-reported diagnosis of illness probably only reflects differences between individuals in knowledge and disclosure of their HIV status. Interestingly, however, the bivariate analysis reveals that those with HIV- and AIDS-specific illnesses are significantly more likely to have opted for private health care compared with those that experienced other HIV- and AIDS-related illnesses ($p < 0.10$) but significantly less so than persons with other illnesses ($p < 0.05$).

illnesses.⁷ Furthermore, we take into account the effect of certain household characteristics in modelling the choice of health care facility, including place of residence (urban vs. rural), household size, age and gender of head of household, household wealth (represented here by a crude asset index) and total real household income.⁸

Empirical studies of demand for health care and of health-care facility choice often include the cost of care as independent variable in regression models. In developing countries, moreover, underutilisation of health-care clinics and services is often prevalent because of the existence of significant non-pecuniary costs of consuming medical services and poor quality of health care. It is therefore popular to also include attribute specific measures such as travel costs, travel time and quality of health care in such models (Akin *et al.*, 1995; Lindelow, 2002; Havemann and Van der Berg, 2003). We chose to exclude these variables (*i.e.* direct and indirect costs and quality of health care) from our model for three reasons. First, treatment and transport costs were only reported in our survey for the facility actually used by the ill individual, whereas discrete choice models such as mixed multinomial logit or conditional logit models (McFadden and Train, 2000) also requires data on treatment and transport costs for alternatives.⁹ In the second instance, there is the problem of endogeneity. Treatment and transport costs are both functions of health-care choice. Similarly, retrospective questions on the reason

⁷ As real household income does not differ significantly by type of illness, we do not explore the interaction between income and type of illness in our paper. However, the effects of severity and type of illness and their interaction differ significant by income level in respect of choice of health-care facility, as explained in the text.

⁸ The asset index and household income are significantly positively correlated ($p < 0.01$), which suggests that one may here also want to include only one of the two because of problems with collinearity. However, these two measures of household welfare are considered here rather as two conceptually different aspects of welfare, namely income and wealth. Estimates of household income as well as all other monetary variables were converted into real values using the most recent consumer price index estimates (2000 = 100) published by Statistics South Africa (2004). In the case of household income, measures of equivalent income were employed to allow for differences in standard of living related to household characteristics (Lipton and Ravallion, 1995; Burkhauser *et al.*, 1997). Household income was adjusted for differences in household size by dividing real monthly income by n^α , where n represents the number of household members and α an adjustment for household economies of scale (Filmer and Pritchett, 1998:13). In this paper, we assigned a value of 0.6 to α . According to Lanjouw and Ravallion (1995), 0.6 represents an adequately robust and reliable adjustment for household economies of scale. Admittedly, it may be advisable to determine how differences in the value of α may actually influence the results presented in this paper. In addition, unadjusted household income estimates may be employed in regression models together with separate variables for household structure with a view to determining how household structure may affect health-care facility choice. Such investigation, however, falls outside the scope of this paper.

⁹ In our survey, we did ask the respondents why ill individuals opted to visit a particular health-care facility. The majority of the responses (approximately 90% or more) were related to affordability and quality of care issues. If one takes the perspective that these responses reflect an individual's evaluation of the cost and quality of care, not only for the facility visited, but also for other alternatives, it is possible to employ these data as proxy measures of cost and quality of health care. Nevertheless, the two other reasons for excluding these variables from the model, namely problems with endogeneity and the presence of collinearity, rule out even this approach.

for choosing to visit a particular health-care facility mean that the response is in part dependent on the choice of facility.¹⁰ Thus, the presence of endogeneity and the absence of suitable instruments to adjust for this endogeneity rule out the inclusion in our model of any of these variables. Finally, one also faces problems of multicollinearity when including the quality of health care and affordability measures derived from the data as determinants of choice of health-care facility, given the strong and significant ties of the latter to other independent variables.¹¹

The logit and xtlogit commands in Stata8 and the appropriate commands for expressing coefficients on explanatory variables as marginal effects (mfx compute) were employed in the econometric analysis (Statacorp, 2003). Continuous variables in the models were transformed into logs and scaled up by one to ensure that zeros were not transformed into missing values.¹²

¹⁰ Treatment, transport costs and quality and affordability of health care are statistically significantly associated with choice of health-care facility ($p < 0.01$). Health-care costs are significantly higher for private as opposed to public health-care services: R340 vs. R28 for treatment costs and R30 vs. R10 for transport costs. In turn, quality of care is the main reason for choosing private health care (84.7%) and affordability is the main reason for choosing public health care (66.7%).

¹¹ Affordability is significantly associated with the need for hospital-based care (positive), severity of illness (negative), severity of HIV- and AIDS-related illness (negative), place of residence (urban) and total household income (negative) ($p < 0.10$). The association of quality of health care with each of these independent variables in the model is also statistically significant ($p < 0.10$), the only difference being that the signs are reversed. The significant association between affordability and quality of care and place of residence is particularly interesting. In urban areas, affordability rather than quality of care is the main reason cited for any health-care choice (69.1% vs. 16.4%), whereas the opposite applies in rural settings (41.7% vs. 52%) ($p < 0.01$). Yet, choice of health-care facility does not exhibit any significant association with place of residence, not in the bivariate nor in the regression analysis (refer Table 4). When including a dummy variable for quality and affordability of health care in the regression models, however, place of residence is statistically significantly associated with choice of private over public health care: persons in urban (rural) areas are significantly more likely to opt for private (public) health care. In these models, the quality and affordability of care variables crowd out most other variables with respect to the size of the coefficients, with quality of care (affordability) as expected being associated with a significantly higher probability of private (public) health-care use.

¹² Marginal effects reflects the change in the probability that an ill individual used private over public health care, associated with a 1% change in the independent variable. Marginal effects of income are reported as partial elasticities in order to assess the effect of income on the probability of seeking private health care over public health care, both on average and specifically for households in the lower and upper quintiles of our sample. The same approach is employed to determine how the effects of type of care and nature and severity of illness on choice of health-care facility differ by income quintile. The specification for calculating income effects (marginal effects) on the probability of seeking private health care over public health care is defined as $\frac{\partial p(x)}{\partial x_k} = g(\beta\beta x \beta_j)$ where $g(z) = \frac{\partial \Lambda(z)}{\partial z}$ and x_k is continuous. The marginal effect is evaluated at the means (Wooldridge, 2002:459) for each income quintile. Here, x_k is the log of real adult equivalent income calculated for individuals from estimates of the total household income. The predicted marginal effect of a change in income for the random effects logit model is calculated at $u_i = 0$.

4. RESULTS AND DISCUSSION

(a) Descriptive Analysis

This section explores the association between gender, age, education and income, and the incidence and severity of illness and decisions about health care use. These results are reported in Table 3. The incidence of illness, calculated here across all individuals who belong to those HIV- and AIDS-affected households that include at least one ill person, exhibits a statistically significant association with gender, age by gender, age and education ($p < 0.01$). Women are significantly more likely than men to have been ill. Given the nature of the HIV and AIDS epidemic, the incidence of illness, as expected, is significantly higher among adults compared with the two other age groups, both in general and for men and women. Furthermore, the incidence of illness is significantly higher among those with primary and secondary education compared with persons with no education or tertiary education. Interestingly, this pattern in the incidence of illness by education closely corresponds to the HIV prevalence rates by education level reported by Shisana and Simbayi (2002). This again underscores the extent to which these data can be argued to be characteristic of the health-care-seeking behaviour of those from HIV- and AIDS-affected households. According to the results presented in Table 3, the incidence of illness declines as household income increases. However, these differences are not statistically significant.

In terms of the severity of illness, women are significantly less likely than men to have recovered from their illness ($p < 0.10$). Furthermore, older persons and older men are significantly less likely to have recovered from their illness ($p < 0.10$ and $p < 0.05$, respectively). Adults are significantly more likely not to be able to perform daily tasks on their own ($p < 0.10$). Less educated persons (especially those without tertiary education) and those from households with lower income levels (in particular, those in the lower three income quintiles of the distribution) are significantly less likely to have recovered from their illness compared with persons with higher levels of education ($p < 0.05$).

In terms of health-care-seeking behaviour, less educated persons are significantly more likely to seek treatment compared with persons with higher levels of education ($p < 0.05$). In turn, adults, in general, are significantly more (less) likely to have visited public (private) health-care facilities compared with children and the elderly ($p < 0.10$). Health-care facility choice is also significantly associated with education. However, the association is not strictly linear. Persons with no education and with tertiary education were most likely to visit private health-care facilities compared with persons with primary or secondary education ($p < 0.01$) (the data revealed that persons with no education that visited a private health-care facility primarily accessed GPs (82.5%) and had no access to medical aid). Most importantly, there is a statistically significant association between income and choice of health-care facility ($p < 0.01$). The proportion of ill persons that visited private (public) health-care facilities increases (declines) with income. Hence, ill persons from poorer HIV- and AIDS-affected households rely mainly on public health care, while ill persons from more affluent households are more likely to visit private health-care facilities.

(b) Determinants of Choice of Health Care Facility

Results, expressed as marginal effects, obtained from the logit estimation for both the pooled and the panel data, are presented in Table 4. The likelihood ratio test, where ρ (ρ) reflects the ratio of the total variance that is due to the panel level variance component,

Table 3. Incidence of illness, characteristics of illness and choice of health-care facility by socio-demographic characteristics

	Incidence of illness (%)	Disability (%)	Mean duration of illness (days)	Has not recovered from illness (%)	Sought treatment (%)	Visited public health-care facility (%)	Visited private health-care facility (%)
Gender:							
Male	19.1	38.2	22.4	79.5	96.9	81.2	18.8
Female	27.0	38.1	22.9	83.7	96.1	81.4	18.6
Sample (n)	3,095	724	726	723	727	696	696
Gender and age:							
Male							
<15 years	28.1	28.8	22.5	70.8	98.6	76.1	23.9
15-49 years	56.5	41.1	22.1	81.5	95.9	85.0	15.0
50+ years	15.4	45.0	23.2	87.5	97.5	76.9	23.1
Sample (n)	1,363	259	259	258	260	250	250
Female							
<15 years	14.4	31.3	22.0	79.1	94.0	74.2	25.8
15-49 years	57.2	40.4	22.7	84.5	97.0	83.7	16.3
50+ years	28.5	36.8	23.8	84.2	95.5	80.3	19.7
Sample (n)	1,732	465	467	465	467	446	446
Total							
<15 years	19.2	30.0	22.3	74.8	96.4	75.2	24.8
15-49 years	56.7	40.6	22.5	83.5	96.6	84.1	15.9
50+ years	24.1	38.6	23.6	85.2	96.0	79.3	20.7
Sample (n)	3,099	727	729	726	730	699	699
Education:							
No education	22.9	37.3	22.8	82.5	98.2	75.3	24.7
Primary education	30.9	32.1	22.6	81.2	97.3	83.9	16.1
Secondary education	43.4	42.0	23.1	84.7	95.6	85.6	14.4
Tertiary education	2.9	42.9	18.1	60.0	85.7	35.3	64.7
Sample (n)	3,094	723	726	722	726	695	695
Income quintile:							
1	23.2	32.1	21.6	85.7	96.4	90.8	9.2
2	24.4	42.9	23.7	81.8	96.1	87.1	12.9
3	21.1	39.0	23.2	87.0	98.7	82.8	17.2
4	18.8	37.5	23.3	75.2	94.2	74.8	25.2
5	12.6	39.1	21.2	79.1	96.7	59.1	40.9
Sample (n)	3,099	727	729	726	730	699	699
Total	23.6	38.1	22.7	82.2	96.4	81.3	18.7
Sample (n)	3,099	727	729	726	730	699	699

Note: Incidence of illness refers to percentage of persons who were continuously ill in the month preceding the interview. Disability represents the percentage of ill persons that were not able to perform daily tasks by themselves. Mean duration of illness represents the mean number of days for which the person was ill in the past month. Incidence of illness, disability, mean duration of illness and recovery from illness are only available for persons who were ill and not for those persons who died in the six months preceding the interview (these persons were not recorded on the household roster in the interview following their death), but for which information on choice of health-care facility is recorded. The percentage of ill persons who visited public and private health-care facilities excludes those who used traditional healers. Income is measured in real adult equivalent per capita terms.

Table 4. Determinants of choice of private over public health care

Independent variable	Model 1		Model 2	
	Pooled logit	Random effects logit	Pooled logit	Random effects logit
	dy/dx (SE)	dy/dx	dy/dx (SE)	dy/dx (SE)
Individual Characteristics:				
Gender (male = 1, female = 0)	-0.009 (0.034)	-0.004 (0.027)	-0.008 (0.035)	-0.002 (0.026)
Log (age)	0.005 (0.020)	0.003 (0.015)	0.006 (0.020)	0.003 (0.014)
Primary education	-0.055 (0.039)	-0.038 (0.029)	-0.052 (0.038)	-0.036 (0.028)
Secondary education	-0.077 (0.040)*	-0.047 (0.034)	-0.075 (0.039)*	-0.045 (0.033)
Tertiary education	0.031 (0.112)	0.062 (0.127)	0.048 (0.111)	0.084 (0.146)
Access to medical aid (yes = 1, no = 0)	0.774 (0.061)***	0.882 (0.063)***	0.778 (0.063)***	0.890 (0.064)***
Required hospital care (yes = 1, no = 0)	-0.089 (0.026)***	-0.064 (0.23)***	-0.089 (0.026)***	-0.060 (0.022)***
Severity of illness (yes = 1, no = 0)	0.075 (0.039)*	0.056 (0.037)	-0.013 (0.044)	-0.023 (0.032)
Suffers from HIV- and AIDS-related illness (yes = 1, no = 0)	-0.099 (0.037)***	-0.081 (0.032)***	-0.137 (0.044)***	-0.115 (0.040)***
Severity of illness*HIV- and AIDS-related illness			0.192 (0.104)*	0.213 (0.136)
Household characteristics:				
Place of residence (urban = 1, rural = 2)	-0.039 (0.037)	-0.025 (0.027)	-0.039 (0.037)	-0.023 (0.026)
Log (household size)	0.004 (0.030)	0.004 (0.026)	0.004 (0.030)	0.004 (0.025)
Log (age of head of the household)	-0.077 (0.066)	-0.056 (0.044)	-0.069 (0.066)	-0.051 (0.041)
Female head of household (yes = 1, no = 0)	0.020 (0.035)	0.027 (0.025)	0.021 (0.036)	0.028 (0.024)
Log (asset index)	-0.043 (0.028)	-0.028 (0.023)	-0.045 (0.029)	-0.030 (0.021)
Log (real adult equivalent income)	0.087 (0.019)***	0.064 (0.017)***	0.087 (0.019)***	0.060 (0.018)***
Number of observations	(685)	(685)	(685)	(685)
Wald chi-squared statistic (p-value)	87.48 (p < 0.001)	45.59 (p < 0.001)	86.79 (p < 0.001)	43.62 (p < 0.001)
Likelihood ratio test of rho = 0 (p-value)		12.70 (p < 0.001)		13.65 (p < 0.001)

Note: Robust standard errors are reported in brackets. Variables were scaled up by one prior to converting variables with zero values into natural logarithms. Severe cases of illness represent cases where the person had been ill for the past month (30 days out of the past month), had not recovered from their illness and was not able to perform daily tasks. Cases of HIV- and AIDS-related illness represent cases where the self-reported diagnosis was given as HIV and AIDS, STDs, tuberculosis, pneumonia, bronchitis or meningitis. Three asterisks denote significance at the 1% level, while two and one asterisk denote significance at the 5% and 10% levels, respectively. The number of observations included in the two regression models ($n = 685$) are slightly fewer than the number of persons in the survey who visited public or private facilities ($n = 699$), given that information on all variables included in the models was missing for a small number of individuals.

is used to compare the pooled estimator with that of the panel estimator. From this test, we infer that the panel estimator is significantly different from the pooled estimator ($p < 0.01$). The variables important in affecting the probability that individuals visit private or public health-care facilities are, however, similar to that observed for the pooled estimation. Overall comparison of the random effects models with the pooled models indicates that the latter somewhat overestimates the effects of individual- and household-specific variables in determining the probability of seeking private health care over public health care. The results obtained from the Wald-type test indicates that all the models are significant in describing choice of health-care facility ($p < 0.01$).

(i) *Individual-Level Characteristics* Neither age nor gender is associated with choice of health-care facility. The results suggest that individuals with secondary education are less likely to visit private health-care facilities than those with no education (Table 4). However, this is the case only in the pooled models. This finding is somewhat surprising as one would have expected to observe a correlation between education, income and the choice of private health-care facilities (or in other words, access to facilities perceived to

provide better quality but more expensive services). The reason for this particular finding is that a significantly larger proportion of individuals with no education opted for private health care (mainly visits to private GPs) compared with those with primary or secondary education: 24.7% vs. 14.4% and 16.1%. Tertiary education did not have a significant effect on the likelihood of visiting private facilities in any of the models, but this may be the result of the small number of individuals in our sample with tertiary education ($n = 21$). However, a bivariate analysis revealed that those with tertiary education are significantly more likely to have visited private health-care facilities (64.7%) compared with persons with lower levels of education ($p < 0.01$).

As expected, access to medical aid in all four models has a strong and significant positive impact on the probability of private health-care utilisation. Havemann and Van der Berg (2003) reported similar findings. Given that access to primary health-care is free in South Africa, it is likely that access to medical aid makes private health-care accessible and is in itself reflective of demand for a higher quality of health care. The latter argument is substantiated by differences in the main reason for visiting public as opposed to private health-care facilities. Two thirds of the persons that used public care did so because treatment was free, whereas 84.7% of the persons who used private care cited quality of care as the main reason for visiting this facility ($p < 0.01$). Palmer (1999) and Havemann and Van der Berg (2003) report similar reasons for the preference of private over public health-care facilities.

Those in need of hospital-based care are largely dependent on the public health-care system, with a statistically significant but relatively small negative marginal effect observed between type of care required and the probability of choosing private over public health care. This result, observed in all four regression models, reflects the fact that only 20 ill persons (2.9%) visited a private or mine hospital, this compared with 22.6% (or 158 persons) who visited public hospitals. The data furthermore reveals that those who visited a public hospital are significantly more likely to have cited affordability (55.7%) rather than quality of care (37.3%) as the main reason for visiting this facility ($p < 0.01$). In turn, those who visited a private hospital are significantly more likely to have cited quality of care (65%) rather than affordability (0%) as the main reason for visiting this facility ($p < 0.01$). The cost of health care for those who visited public as opposed to private hospitals differs significantly: R85 vs. R1,095 ($p < 0.01$). Hence, our results indicate that the high cost of private hospitalisation results in a strong preference for public hospitalisation among ill individuals in our sample of HIV- and AIDS-affected households.¹³

¹³ Other evidence from South Africa suggests that the affluent and in some cases, even relatively poor people, prefer to use private care in a health system where public care is considered an inferior, poor quality product (Havemann and Van der Berg, 2003). Our results, however, reflect a stronger preference for public care among ill individuals who require hospital care. In our study population, even persons in the upper half of the relative income distribution remain relatively poor compared with the national standards. Based, for example, on a poverty line of R250 real adult equivalent income per month (Statistics South Africa, 2000:11), more than four in 10 of the households in our study would be considered poor (43.1%). At the higher poverty lines currently being considered by the South African government, an even larger proportion of households in our study would be classified as poor. Hence, we would expect strong preferences for free or subsidised public care over more expensive private hospital care.

Persons who suffer more severe illness (those who were ill for 30 days of the past month, who had not recovered from their illness and who could not perform daily tasks) are more likely to opt for private as opposed to public health care. Again, considerations of quality of care and affordability seem to be key in driving this decision. Those with severe illness are significantly more likely to have cited quality of care (50.7%) rather than affordability (41.2%) as the main reason for visiting a particular facility ($p < 0.01$). Mean health-care costs, moreover, are significantly higher for severe as opposed to non-severe illnesses: R282 vs. R50 ($p < 0.01$). However, severity of illness is only significant as a determinant of choice of health-care facility in the first pooled model (model 1). Havemann and Van der Berg (2003:17-18) similarly report that those with more severe or serious illness exhibit a preference for private care over other alternatives.

Finally, and most importantly, those with HIV- and AIDS-related illness are significantly less likely to visit private health-care facilities and thus remain dependent on public health care. This result is observed in all four of the regression models and probably reflects the extent to which poorer households are more susceptible and vulnerable to HIV and AIDS (Gillies *et al.*, 1996; Nyamathi *et al.*, 1996; Desmond, 2001; Poku, 2001; Whiteside, 2002), as well as the extent to which HIV and AIDS and its associated effects will push households into or deeper into poverty (Bachmann and Booysen, 2003, 2004; Gaffeo, 2003; Booysen, 2004). Together, this explains why those with HIV- and AIDS-related illnesses remain dependent on the public health-care system. When severity of illness is interacted with type of illness, the results interestingly show that those with more severe HIV- and AIDS-related illness exhibit a preference for private over public health care. Once again, the bivariate analysis shows that persons experiencing severe HIV- and AIDS-related illness are significantly more likely to have cited quality of care (52.6%) than affordability (39.2%) as the main reason for visiting a particular facility ($p < 0.01$). Mean health-care costs are significantly higher for severe HIV- and AIDS-related illnesses as opposed to other non-severe illnesses: R367 vs. R57 ($p < 0.01$). As was the case with severity of illness in general, however, this result is only significant for the pooled model (model 2).

(ii) *Household-Level Characteristics* The partial elasticity associated with the logarithm of real adult equivalent household income is positive and highly significant in influencing the choice to visit private health-care facilities.¹⁴ This largely is the result of the greater direct and indirect costs incurred in accessing private as opposed to public care. Havemann and Van der Berg (2003) likewise report that preferences for private care increase as income increases, while demand for public care is high among persons from poor households. None of the other household characteristics exhibited a statistically significant relationship with choice of health facility.

(c) *Income and Choice of Health Care Facility*

The discussion now proceeds to the further disaggregated results of the analysis of how income may influence choice of health-care facility in the context of the HIV and AIDS epidemic. We investigate the nature of these marginal effects using the model where the particular variable of interest (*i.e.* income, severity of illness, type of illness and severity of

¹⁴ As mentioned elsewhere, the relationship between health-care choice and income may be endogenous. In the absence of an appropriate instrument, we do not correct for this.

HIV- and AIDS-related illness, respectively) on aggregate is statistically significantly associated with choice of health-care facility (refer Table 4).

For the logit estimation from the pooled sample (Table 5), the change in probability of choosing private health care over public health care varies from 0.029 for a 1% increase in income evaluated at the mean of the poorest quintile to 0.174 for a 1% increase in income evaluated at the mean of the wealthiest quintile. For the random effects logit estimation, the difference in marginal effect of income is even more pronounced. Here, a 1% increase in income for the poorest quintile only increases the probability of using private health care over public health care by 0.013, whereas a 1% increase in income for the richest quintile translates into an increase in the probability of using private over public health care by 0.187. The chronically poor (those that remained in the bottom quintile in each period of the survey) therefore are likely to remain dependent on public health care compared with the more affluent. Hence, the results reveal that the marginal effect of income on demand for private over public health care varies, depending on level of income. When evaluated at the mean income for each quintile, the probability of choosing private health care over public health care becomes pronouncedly more inelastic the lower the income quintile. Yet, it is not only the effect of income on choice of health-care facility that varies depending on the level of income, but also the effect of severity and type of illness as well as type of care required.

The results from the pooled model show that the probability of choosing private over public health care in the case of severe illness increases with household income (Table 6). In the bottom quintile of the distribution, severity of illness is not significantly associated

Table 5. Marginal effect of income on choice of private over public health care, by income quintile

Quintile	Mean real adult equivalent income	Pooled Logit dy/dx (SE)	Random Effects Logit dy/dx (SE)
1	79.56	0.029 (0.005)***	0.013 (0.006)**
2	217.23	0.083 (0.018)***	0.056 (0.016)***
3	326.54	0.104 (0.027)***	0.079 (0.024)***
4	546.17	0.133 (0.041)***	0.116 (0.041)***
5	1,342.93	0.174 (0.056)***	0.187 (0.072)***
Mean	412.02	0.087 (0.019)***	0.060 (0.018)***

Note: Further disaggregated results for model 2 (Table 4). Robust standard errors are reported in brackets. Three, two and one asterisks denote significance at the 1%, 5% and 10% levels, respectively.

Table 6. Marginal effect of severity of illness on choice of private over public health care by income quintile

Quintile	Mean real adult equivalent income	Pooled Logit dy/dx (SE)	Random Effects Logit dy/dx (SE)
1	79.56	0.026 (0.016)	0.013 (0.011)
2	217.23	0.072 (0.038)*	0.053 (0.036)
3	326.54	0.088 (0.046)*	0.072 (0.047)
4	546.17	0.109 (0.056)*	0.101 (0.064)
5	1,342.93	0.136 (0.067)**	0.148 (0.089)*
Mean	412.02	0.075 (0.039)*	0.056 (0.037)

Note: Further disaggregated results for model 1 (Table 4). Robust standard errors are reported in brackets. Three, two and one asterisks denote significance at the 1%, 5% and 10% levels, respectively.

Table 7. Marginal effect of HIV- and AIDS-related illness on choice of private over public health care by income quintile

Quintile	Mean real adult equivalent income	Pooled Logit dy/dx (SE)	Random Effects Logit dy/dx (SE)
1	79.56	-0.047 (0.023)**	-0.026 (0.016)
2	217.23	-0.131 (0.042)***	-0.108 (0.039)***
3	326.54	-0.162 (0.050)***	-0.148 (0.049)***
4	546.17	-0.202 (0.062)***	-0.210 (0.065)***
5	1,342.93	-0.254 (0.075)***	-0.312 (0.092)***
Mean	412.02	-0.137 (0.044)***	-0.115 (0.040)***

Note: Further disaggregated results for model 2 (Table 4). Robust standard errors are reported in brackets. Three, two and one asterisks denote significance at the 1%, 5% and 10% levels, respectively.

Table 8. Marginal effect of severe HIV- and AIDS-related illness on choice of private over public health care by income quintile

Quintile	Mean real adult equivalent income	Pooled Logit dy/dx (SE)	Random Effects Logit dy/dx (SE)
1	79.56	0.072 (0.053)	0.054 (0.048)
2	217.23	0.185 (0.101)*	0.202 (0.132)
3	326.54	0.221 (0.113)**	0.262 (0.156)*
4	546.17	0.261 (0.123)**	0.340 (0.179)*
5	1,342.93	0.300 (0.124)**	0.428 (0.181)**
Mean	412.02	0.192 (0.104)*	0.213 (0.136)

Note: Further disaggregated results for model 2 (Table 4). Robust standard errors are reported in brackets. Three, two and one asterisks denote significance at the 1%, 5% and 10% levels, respectively.

with choice of health-care facility. For the panel model, the probability of choosing private over public health care is only significantly and positively associated with severity of illness in the top quintile of household. Thus, only ill individuals from more affluent households in this population of HIV- and AIDS-affected households can afford to opt for private over public health care when experiencing severe illness.

Other things being equal, persons with HIV- and AIDS-related illness remain dependent on public health-care services (Table 7). However, the probability of choosing public over private health care declines as household income increases. This is the case in both models, the only exception being that type of illness is not significantly associated with the choice of health-care facility in the bottom quintile of the income distribution in the panel model.

Income is crucial in affording those with severe HIV- and AIDS-related illnesses access to private health-care facilities (Table 8). With the exception of the bottom quintile of the income distribution, the probability of choosing private over public health care when experiencing severe HIV- and AIDS-related illnesses increases with household income in the pooled model. In the case of the panel model results, this positive and significant association between choice of health-care facility and severity of HIV- and AIDS-related illness is only observed in the top half of the income distribution. Therefore, only ill individuals from more affluent households (or non-poor households if we define households in the bottom 40% of the income distribution as poor as is common in many poverty studies) are in a position to opt for private over public health care when experiencing severe HIV- and AIDS-related illness.

5. CONCLUSION

In addition to access to medical aid and household income, the nature and severity of the illness are important in explaining differences in choice of health-care facility among ill persons from HIV- and AIDS-affected households. As reported in most of the literature, the poor are significantly more likely to opt for public care while the more affluent choose private health care. The results show that ill persons with HIV- and AIDS-related illness rely primarily on public health-care services, although this dependency on public health care declines as household income increases. The results suggest that only more affluent HIV- and AIDS-affected households are in a position to afford access private rather than public health-care services when experiencing severe and particularly severe HIV- and AIDS-related illness. The evidence illustrates that severity and type of illness play little or no part in explaining differences in the choice of health-care facility of those in poorer households. Thus, household welfare stands central in decisions related to choice of health care facility. Given that poorer households are more susceptible and vulnerable to HIV and AIDS, and based on evidence that HIV and AIDS and its associated effects may push households into or deeper into poverty, those affected by HIV and AIDS therefore most likely will remain largely dependent on the public health-care system. As the poor may also be less likely to access health care at all, vigilance is required in ensuring that the poor have equitable access to efficient, quality health services, not only to antiretroviral treatment but also to palliative and other care provided via the public health system.

APPENDIX

Table A. Descriptive statistics

Variable	Sample (n)	Mean	Standard error	Confidence interval 95%
<i>Individual-level characteristics:</i>				
Gender (Male = 1, Female = 0)	699	0.187	0.015	0.158-0.216
Log (Age)	727	0.358	0.018	0.323-0.393
Primary education	730	3.280	0.035	3.211-3.349
Secondary education	726	0.309	0.017	0.275-0.342
Tertiary education	726	0.434	0.018	0.398-0.470
Access to medical aid (yes = 1, no = 0)	726	0.029	0.006	0.017-0.041
Required hospital care (yes = 1, no = 0)	729	0.055	0.008	0.038-0.071
Severity of illness (yes = 1, no = 0)	704	0.253	0.016	0.221-0.285
Suffers from HIV- and AIDS-related illness (yes = 1, no = 0)	730	0.205	0.015	0.176-0.235
Severity of illness*HIV- and AIDS-related illness	721	0.566	0.018	0.530-0.602
<i>Household-level characteristics:</i>				
Place of residence (urban = 1, rural = 2)	721	0.135	0.013	0.110-0.160
Log (Household Size)	730	0.456	0.018	0.420-0.492
Log (Age of head of the household)	730	1.524	0.021	1.482-1.565
Female head of household (yes = 1, no = 0)	730	3.892	0.012	3.869-3.915
Log (Asset index)	730	0.564	0.018	0.528-0.600
Log (Real adult equivalent income)	730	1.387	0.021	1.345-1.429
	730	5.474	0.050	5.375-5.572

Note: Individual-level characteristics refer to outcomes or survey responses measured at an individual level. Severe cases of illness represent cases where the person had been ill for the past month (30 days out of the past month), had not recovered from their illness, and was not able to perform daily tasks. Cases of HIV- and AIDS-related illness represent cases where the self-reported diagnosis was given as HIV and AIDS, STDs, tuberculosis, pneumonia, bronchitis or meningitis.

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