Impact of HIV infection on self-rated health in a high-prevalence population with low awareness of own HIV status

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ABSTRACT

Background: Self-rated global health status has been found to be a sensitive marker of declining health and to operate as an independent predictor of survival. This study examines the effect of HIV infection on self-rated health in a population with high prevalence of HIV infection and low awareness of own status of HIV infection.

Methods: The data stem from a comprehensive population-based HIV survey conducted in selected urban and rural populations in Zambia in 1996. A total of 1951 males and 2158 females of age more than 14 years were interviewed of which 6% refused to be tested for HIV infection. A logistic regression model was used assuming socio-demographic factors, mental distress and health care use to be associated both with HIV infection and self-rated health.

Results: The proportion of persons judging their health status as poor was higher in the rural than in the urban population. Generally no major difference in the proportions of persons rating their health status as poor was observed between sexes. The proportion of poor self-rated health status increased linearly with age. Use of health care services, mental distress and self-perceived risk of HIV infection were negatively associated with self-rated health. Both males and females living in an urban area and males living in a rural area of age more than 24 years who were infected with HIV were about twice as likely to rate their health status as poor compared to respondents who were not infected with HIV.

Conclusion: HIV infection had a strong independent negative effect on self-rated health in persons of age greater than 24 years. This measure of people's subjective health may be used as a valuable "diagnostic" tool in HIV-related care and support programmes, and should be evaluated for use in such services.

INTRODUCTION

Self-rated health (SRH) is an overall, self-assessment of an individual's health status. In most surveys it is based on the question: "How in general would you rate your health?" The responses are usually on a four- or five-point scale, ranging from poor to excellent (1), which has been dichotomised into 'good or excellent' and 'fair or poor' (2-3). There is an extensive literature based on this simple global assessment, and one of the most intriguing findings from population-based studies is that it operates as an independent predictor of survival (1,4). A dose-response relationship between the probability of mortality and self-rated health has also been a consistent observation, i.e. showing the highest mortality among persons rating their health as poor and lowest among persons rating their health as excellent. Furthermore, the effect of SRH on the prediction of mortality is more apparent for males than females (1). Self-ratings thus represent a source of valuable data on health status, and as noted by Idler and Benyamini "Self-rated health represents an irreplaceable dimension of health status and in fact that an individual's health status cannot be assessed without it" (1).

In line with the results concerning the validity of self-rated health, the reliability of the measure has been found to be good. Lundberg and Manderbacka studied the test-retest reliability of self-rated health and compared it with the reliability of other more specific health status indicators (5). They concluded that the reliability is as good as or even better than that of the more specific indicator questions. Respondents seem to be taking into consideration a wide range of factors or conditions being of relevance to their health status. In 158 in-depth interviews, Krause and Jay found that study participants thought about specific health problems, general physical functioning and health behaviours in answering the question (6).

Studies of the predictors of self-rated health have provided insights into the different dimensions of self-rated health. Depression as an independent determinant has been confirmed in many studies. Even after taking into account physical illness and functional disability, self–rated health was still strongly and independently associated with depressive symptoms (7-9). Leibson *et al.* found that self-rated physical health was

associated with both minor and serious depression (10). In another study, Gazmararian *et al*. revealed that fair or poor self-rated health had higher odds for depressive symptoms (11).

Consistently, SRH has been found to predict health care seeking. Fylkesnes and Førde and Fylkesnes found that self-rated health was the most important determinant of both general practitioner visits and use of referral services (12,13). An association between lifestyle or health related behaviour and self-rated health has also been confirmed. Manderbacka *et al.* concluded in their study on the contribution of risk factors and health behaviours to self-rated health that even in the absence of health consequences, risk factors and risky behaviours effect one's perceived health (14). Leisure physical activity has been found to be positively related to self-evaluated health in both males and females (7,12). In another study conducted by Fleishman and Crystal in 10 cities across the United States, it was shown that declines in physical functioning were related to poor self-rated health (15). In this regard it should be noted that inactivity has been found to predict mortality (16).

We have previously reported that declining self-rated health had a major influence on readiness for voluntary HIV counselling and testing among men and women aged >24 years (17). We have not found any work on the relationship between HIV and self-rated health. This paper is based on a comprehensive population-based HIV survey in Zambia revealing HIV prevalence rates of 25% in urban and 16% in rural populations and with less than 8% of the respondents being aware of their own HIV status (18-19). Our main aim is to examine the impact of HIV infection on self-rated health by using theoretical statements about other important factors that relate both to HIV infection and self-ratings, i.e. social status, self-perceived risk of HIV infection, mental distress and use of health care services.

METHODS

Study populations

Population-based HIV surveys are conducted in Zambia every three years since 1996 in order to document the dynamics of the HIV epidemic. These surveys are conducted in Chelstone, a medium density urban residential area in Lusaka, and in Kapiri Mposhi. Chelstone was selected to represent urban residential areas in Zambia. In 1996 both rural and urban areas of Kapiri Mposhi were surveyed. In subsequent surveys, urban Kapiri Mposhi was excluded from the surveys because it did not represent a typical urban area of Zambia.

A stratified random-cluster sampling method was used by employing the mapping system established by Central Statistical Office. This system divides the country into areas called Census Standard Areas (CSA) which are further subdivided into smaller areas called Standard Enumeration Areas (SEA). On average a CSA is divided into three SEAs. For the purpose of the study, one SEA was randomly selected and all persons of age 15 years or more were requested to participate in the surveys. For the current analysis, we chose to use data collected from rural Kapiri Mposhi, to represent rural areas, and Chelstone, to represent urban areas of Zambia. The CSA was considered a cluster. The 1996 surveys were conducted in 5 clusters in rural Kapiri Mposhi and in 10 clusters in urban Chelstone.

Sample size and participation

The total response rate for men was 71.3% compared with 92.0% among women (18), yielding totals of 1951 males and 2158 females, who participated in the study. The refusal rate to be tested for HIV by both males and females was 8.3% in urban area and 3.4% in rural area. Fylkesnes *et al.* have described the sample (18).

Personal interviews

The questionnaire had several modules among which were socio-demographics, health seeking behaviour and mental distress. The highest level of education completed was coded into three levels: up to Grade 7, Grades 8 and 9, and Grade 10 or more. Travel as a variable was derived from the question: Have you during the past years been on regular trips where you have to stay away from home for several days or more? A respondent was deemed to have used a health facility if he or she had visited any of the following in the last one-year preceding the survey: private doctor/ clinic, the local health centre, or the hospital. Meanwhile a participant was considered mentally distressed if he or she answered yes to any of the following questions: In the last 30 days: Have you slept badly? Have you cried more than unusual? Has the thought of ending your life been on your mind?

The dependent variable was based on the question "How would you say your health is at the moment? Is it very poor, poor, fair, good or excellent? In the analysis the dependent variable was grouped into two: very poor, poor or fair into one group we now call "poor self rated status", and good or excellent into another group we call "good self rated status". The outcome measure henceforth is poor self-rated status.

The distribution of the dependent variable was as follows: "very poor" (N=21), "poor" (N=149), "fair" (N=779), "good" (N=2152) and "excellent" (N=601). The group "fair" was combined together with the groups "very poor" and "poor" because the later groups were very small. Furthermore, previous studies had similar categorisation (2-3,7).

Laboratory analysis

For the sole purpose of research, saliva samples were collected and tested for HIV infection using Gacelisa

HIV 1 & 2 (Welcome Diagnostics, Dartford, Kent, UK). The sensitivity and specificity of Gacelisa was 100% for both diagnostic parameters when compared with HIV 1 & 2 (BIONOR AS, Skien, Norway) (20). The rate of agreement between Gacelisa and HIV 1 & 2 (BIONOR AS) was 99.8% (20). The validation took into account paired saliva and serum samples which were collected from 494 antenatal care clients.

Ethical consideration

The study was approved by the National AIDS Research Committee, Zambia. Consent was obtained from the individual before administering the questionnaire. Further consent was obtained from the respondent before collecting saliva specimen. Participants wishing to know their HIV status gave separate consent and upon consenting, they were counselled following the laid down procedure by the Government of Zambia.

Theoretical framework

This study of predictors of self-rated health was conducted in populations with very high prevalence rates of HIV infection, whereas only a small proportion of the respondents knew their own HIV status, i.e. 8% of the survey respondents were previously tested for HIV infection (18). The information on history of HIV testing was not taken into account in the analysis since those previously HIV tested were not found to differ from those never tested either in terms of self-rated health or HIV status. The level of HIV-related knowledge was generally high, e.g. signs/symptoms of "HIV-disease" and preventive measures, but less than 1% of the HIV infected persons at the time of the survey was on ARV treatment.

The impact of HIV infection is expected to be seen after a certain period of being infected (17). Self-rated health has consistently been found to be a sensitive marker of declining health status, and our general assumption is that this global measure also taps illness experience directly related to HIV infection. Our model assumption was that socio-demographic factors (age, sex, marital status, educational attainment and residence) and risk-taking behaviour are associated both with HIV infection and self-rated health. We further assumed that the relationship between HIV infection and self-rated health is confounded by mental distress and use of health care services (as measured by use of professional health care services and traditional practitioners).

Data analysis

The data were computerised using Epi Info. Consistency and range checks were used to edit the data set. We opted for residence, age group and sex stratified analysis because of differences in the prevalence rates of HIV infection between groups of these factors. Analysis was done in Stata using the logistic regression for survey data in order to adjust for clustering effect, and to adjust for possible confounders. Possible confounders for the preliminary models were age, marital status and education. In the final model of the association between HIV infection and SRH, mental distress and health facility use were also, in addition, adjusted for in the analysis. Odds ratio (OR) and the 95% confidence interval were used to determine the magnitude and significance of the association.

RESULTS

The distribution of self-rated health status according to residence, sex and age is shown in Table 1. The proportion of persons judging their health status as poor was significantly higher in the rural (32.5%) than in urban (22.4%) area ($p<0.001$). Although generally there was a tendency for females to have higher rates than males for poor self-rated health status, no significant differences were observed between sexes except in the 20-24 years ($p=0.029$) and 50 years or more age groups. The proportion of poor self-rated health status significantly increased linearly with age ($p<0.001$) in both sexes and residential areas.

Table 1. Distribution of persons according to self-rated health by residence, sex and age.

	Rural								Urban							
	Male				Female				Male				Female			
Age group	Self rated health (%)				Self rated health (%)				Self rated health (%)				Self rated health (%)			
(years)	Total	VP/F	G	E	Total	VP/F	G	E	Total	VP/F	G	E	Total	VP/F	G	E
15-19	82	22.0	64.6	13.4	136	18.4	72.8	8.8	282	17.0	52.8	30.1	430	16.3	60.0	23.7
20-24	114	14.9	68.4	16.7	120	27.5	63.3	9.2	195	20.5	53.3	26.2	353	21.0	59.2	19.8
25-29	72	25.0	66.7	8.3	81	28.4	64.2	7.4	138	23.2	53.6	23.2	230	20.0	65.2	14.8
30-34	53	41.5	54.7	3.8	64	43.8	51.6	4.7	99	24.2	59.6	16.2	203	23.2	59.6	17.2
35-39	45	31.1	64.4	4.4	59	33.9	62.7	3.4	91	26.4	47.3	26.4	156	30.8	56.4	12.8
40-49	68	35.3	57.4	7.4	76	34.2	64.5	1.3	139	25.9	52.5	21.6	120	35.0	54.2	10.8
50+	110	46.4	51.8	1.8	103	64.1	35.9	0	51	41.2	51.0	7.8	27	44.4	51.9	3.7
Total	544	30.1	61.2	8.6	639	34.6	59.9	5.5	995	22.6	53.1	24.3	1519	22.3	59.6	18.1

% are age specific

Self rated health: VP/F – very poor, poor or fair; G – good; E – excellent

Socio-demographic factors and SRH

Table 2a shows the associations between socio-demographic factors and SRH, stratified by age and sex in rural Kapiri Mposhi. Associations were controlled for age. Only travel and risk perception of HIV infection, were independently associated with SRH among males in the age group 15-24 years. Male respondents who had travelled were 3.63 (95% CI 1.17, 11.25) times more likely to rate their health status as poor compared to male respondents who had not travelled. Meanwhile, male participants in the same age group who perceived themselves as being at risk of HIV were 2.24 (95% CI 1.06, 4.71) times more likely to rate their health status as poor.

Among female participants in the age group 15-24

Table 2a. Associations of sociodemographic characteristics with self-rated health in a rural population according to age and sex.

	Age group (year)											
	15-24						25+					
	Male			Female			Male			Female		
Variable	Total	%	OR (95% CI)*	Total	%	OR (95% CI)	Total	%	OR (95% CI)	Total	%	OR (95% CI)
Marital status												
Unmarried	161	16.8	1	131	14.5	1	91	41.8	1	103	48.5	1
Married	35	22.9	1.68 (0.62, 4.56)	125	31.2	**2.20 (1.07, 4.51)**	257	35.4	0.74 (0.45, 1.21)	280	40.4	0.97 (0.60, 1.57)
Education (years)												
<8	115	19.1	1.21 (0.56, 2.60)	180	24.4	1.51 (0.74, 3.09)	257	39.3	1.27 (0.76, 2.14)	303	45.2	1.28 (0.73, 2.23)
8,9	48	12.5	0.56 (0.22, 1.46)	57	19.3	0.74 (0.35, 1.58)	45	31.1	0.81 (0.41, 1.61)	35	42.9	1.43 (0.68, 3.04)
10+	31	22.6	1.43 (0.55, 3.68)	16	18.8	0.57 (0.14, 2.32)	46	30.4	0.82 (0.41, 1.61)	44	22.7	0.48 (0.22, 1.02)
Employment												
Unemployed	154	16.2	1	246	22.8	1	148	39.2	1	318	43.4	1
Employed	42	23.8	1.68 (0.70, 4.04)	10	20.0	0.75 (0.14, 3.89)	200	35.5	1.68 (0.70, 4.04)	65	38.5	0.90 (0.51, 1.59)
Religion												
Catholic	49	12.2	1	61	19.7	1	92	44.6	1	101	42.6	1
Non-catholic	143	20.3	1.84 (0.71, 4.75)	194	23.7	1.22 (0.59, 2.50)	230	34.8	0.70 (0.43, 1.16)	274	42.0	0.91 (0.56, 1.46)
Travel												
No	181	16.0	1	241	22.0	1	289	37.0	1	362	42.8	1
Yes	15	40.0	**3.63 (1.17, 11.25)**	14	35.7	1.64 (0.50, 5.37)	59	37.3	1.05 (0.58, 1.89)	20	35.0	0.75 (0.29, 1.93)
Risk perception of HIV												
Not at risk	126	13.5	1	153	17.0	1	189	34.9	1	192	43.8	1
At risk	70	25.7	**2.24 (1.06, 4.71)**	103	31.1	**1.96 (1.06, 3.61)**	159	39.6	1.46 (0.92, 2.32)	191	41.4	1.27 (0.82, 1.99)

% are factor specific
* adjusted for age

Table 2b. Associations of sociodemographic characteristics with self-rated health in an urban population according to age and sex.

	Age group (year)											
	15-24						25+					
	Male			Female			Male			Female		
Variable	Total	%	OR (95% CI)*	Total	%	OR (95% CI)	Total	%	OR (95% CI)	Total	%	OR (95% CI)
Marital status												
Unmarried	458	18.1	1	609	17.9	1	148	20.3	1	179	25.1	1
Married	19	26.3	0.93 (0.45, 1.93)	174	20.1	**1.42 (1.02, 1.99)**	370	28.9	1.18 (0.80, 1.73)	557	26.9	0.85 (0.64, 1.14)
Education (years)[#]												
<8	120	9.2	0.77 (0.51, 1.17)	293	21.8	**1.44 (1.08, 1.92)**	93	26.9	1.27 (0.89, 1.80)	258	29.8	**1.43 (1.09, 1.88)**
8,9	175	18.3	0.94 (0.61, 1.44)	257	14.8	0.82 (0.60, 1.11)	51	29.4	1.36 (0.86, 2.15)	118	24.6	0.84 (0.57, 1.26)
10+	180	25.0	1.38 (0.91, 2.10)	227	18.1	0.74 (0.52, 1.07)	371	25.9	**0.70 (0.51, 0.97)**	347	24.8	**0.74 (0.55, 0.98)**
Employment												
Unemployed	410	17.6	1	683	18.6	1	112	27.7	1	440	30.0	1
Employed	64	25.0	**1.66 (1.03, 2.68)**	98	16.3	1.23 (0.82, 1.84)	406	26.1	0.76 (0.54, 1.07)	294	21.4	**0.62 (0.47, 0.82)**
Religion												
Catholic	160	21.9	1	239	17.6	1	155	26.5	1	192	28.1	1
Non-catholic	253	16.2	0.77 (0.51, 1.18)	487	18.3	1.19 (0.86, 1.65)	290	25.5	0.93 (0.65, 1.33)	506	26.1	1.07 (0.78, 1.47)
Travel												
No	424	17.9	1	727	17.9	1	410	29.5	1	653	26.8	1
Yes	53	22.6	1.63 (0.95, 2.81)	53	24.5	1.45 (0.87, 2.42)	107	14.0	**0.51 (0.33, 0.80)**	79	22.8	1.13 (0.73, 1.74)
Risk perception of HIV infection												
Not at risk	304	17.4	1	499	16.2	1	264	22.3	1	331	21.8	1
At risk	170	20.6	1.43 (0.96, 2.13)	279	21.9	**1.68 (1.26, 2.25)**	249	31.3	**1.51 (1.09, 2.09)**	404	30.2	**1.70 (1.29, 2.25)**

% are factor specific, * adjusted for age
[#] reference for <8 is >7; for 8,9 is combined <8 and 10+; and for 10+ is <10

years, the socio-demographic factors that determined the rating of health status as poor were marital status and self perceived risk of HIV infection. Married women were 2.20 (95% CI 1.07, 4.51) times more likely to rate their health status as poor compared to unmarried women. Female respondents who self perceived themselves as being at risk of HIV infection were 96% (OR=1.96, 95% CI 1.06, 3.61) more likely to rate their health status as poor compared to respondents who had not travelled.

In the age group 25 years or more, no significant associations were observed between socio-demographic factors and self perceived risk of HIV infection with SRH in rural area.

Employed male respondents of age 15-24 years who were urban residents were 66% (OR=1.66, 95% CI 1.03, 2.68) more likely to rate their health status as poor compared to the respondents who were not employed (Table 2b). Meanwhile, females in the same age group who were married (OR=1.42, 95% CI 1.02, 1.99), of less than 8 years of education (OR=1.44, 95% CI 1.08, 1.92) and who self-perceived themselves of being at risk of HIV infection (OR=1.68, 95% CI 1.26, 2.25) were 42%, 44% and 68%, respectively, more likely to rate their health status as poor compared to females in he same age group who were unmarried, had at least 8 years of education, and who did not perceive themselves as being at risk of HIV infection.

Several socio-demographic factors were significantly associated with SRH among respondents of age greater than 24 years (Table 2b). Male participants who attained 10 years or more of education (OR=0.70, 95% CI 0.51, 0.97) and had travelled (OR=0.51, 95% CI 0.33, 0.80) were 30% and 49%, respectively, less likely to rate their health status as poor compared to male participants who had attained less than 10 years of education, and had not travelled. Males who self perceived as being at risk of HIV infection were 51% (OR=1.51, 95% CI 1.09, 2.09) more likely to rate their health status as poor, compared to males who did not perceive themselves as being at risk of HIV infection.

Education, employment and self-perceived risk of HIV infection were significantly associated with SRH among female participants of age greater than 24 years. Female participants of low education level were more likely to rate their health status as poor compared to female respondents who had attained higher educational level. Employed female respondents were 38% (OR=0.62, 95% CI 0.47, 0.82) less likely to rate their health status as poor compared to unemployed female respondents. Females who self-perceived themselves as being at risk of HIV infection were 70% (OR=1.70, 95% CI 1.29, 2.25) more likely to rate their health status as poor compared to female respondents who did not perceive themselves as being at risk of HIV infection.

Mental distress and SRH

Table 3 shows associations of mental distress with self-rated health adjusted for age. In all groups except for males of age less than 25 years, mental distress was associated with SRH. Stronger associations were observed in a rural area than in an urban area. Persons who were distressed were more likely to rate their health status as poor compared to participants who were not distressed.

Health care use and SRH

The associations between health facility utilisation and self-rated health are shown in Table 4. No significant associations were observed between health facility use and SRH in the younger age group (15-24 years) in a rural area. In the older age group (25 or more years), use of traditional healers among males (OR=2.93, 95% CI 1.16, 7.43) and use of modern health facilities among females (OR=1.63, 95% CI 1.01, 2.61) were significantly associated with SRH.

In an urban area, significant associations between health facility utilisation and SRH were observed in both sexes and age groups. Consistently, in all groups, persons who utilised health care facilities were more

Table 3. Associations of mental distress with the self-rated health according to age and sex.

	Age group (year)											
	15-24						25+					
	Male			Female			Male			Female		
Residence	Total	%	OR (95% CI)*	Total	%	OR (95% CI)	Total	%	OR (95% CI)	Total	%	OR (95% CI)
Rural												
Mental distress												
No	188	17.0	1	236	19.1	1	317	34.1	1	326	36.5	1
Yes	8	37.5	3.04 (0.68, 13.61)	19	68.4	**8.30 (2.84, 24.25)**	31	67.7	**3.95 (1.78, 8.77)**	56	76.8	**5.49 (2.76, 10.90)**
Urban												
Mental distress												
No	435	17.5	1	692	16.3	1	449	22.7	1	611	21.1	1
Yes	38	26.3	1.66 (0.87, 3.18)	85	34.1	**2.24 (1.51, 3.33)**	67	50.7	**3.28 (2.12, 5.08)**	123	53.7	**4.28 (3.06, 6.00)**

% are factor specific
* adjusted for age

likely to rate their health status as poor compared to persons who did not use the facilities. Generally, associations were stronger for use of traditional healers than modern health facilities.

Impact of HIV on SRH

Associations between HIV infection and SRH were first adjusted for age, then in addition, for other sociodemographic factors and self perceived risk of HIV infection, and lastly, in addition, for mental distress and health care utilisation (Table 5). This analysis enabled us to determine the direct impact of HIV infection on self-rated health. HIV infection did not have a significant impact on self-rated health in the younger age group (15-24 years) in both rural and urban areas. In the older age group (25 years or more), males who were HIV infected were 1.93 (95% CI 1.03, 3.63) and 2.19 (85%CI 1.44, 3.35) times more likely to rate their health status as poor compared to non-HIV infected older males in Kapiri Mposhi and Chelstone, respectively. Mental distress and health facility utilisation accounted for 12.3% and 13.1% reduction in the magnitude of association (changes in the odds ratios when both mental distress and health facility utilisation are in the model and when they are not in the model) between HIV infection and SRH, in a rural and urban area, respectively.

Although there was no association between HIV infection and SRH among older female respondents in a rural area, older females in an urban area were 2.20

Table 4. Associations of health care utilisation with self-rated health (SRH) according to age and sex.

	Age group (year)											
	15-24						25+					
	Male			Female			Male			Female		
Residence	Total	%	OR (95% CI)*	Total	%	OR (95% CI)	Total	%	OR (95% CI)	Total	%	OR (95% CI)
Rural												
Modern facility use												
No	91	13.2	1	95	17.9	1	115	31.3	1	118	36.4	1
Yes	105	21.9	1.86 (0.87, 3.98)	161	25.5	1.65 (0.86, 3.14)	233	39.9	1.44 (0.89, 2.32)	265	45.3	**1.63 (1.01, 2.61)**
Traditional facility use												
No	189	17.5	1	239	21.8	1	323	35.6	1	356	42.1	1
Yes	7	28.6	1.94 (0.35, 10.74)	17	35.3	1.68 (0.56, 5.01)	24	58.3	**2.93 (1.16, 7.43)**	27	48.1	1.78 (0.81, 3.90)
Urban												
Modern facility use												
No	238	10.9	1	363	11.0	1	215	19.1	1	277	14.8	1
Yes	232	26.7	**1.95 (1.32, 2.89)**	407	25.1	**2.39 (1.77, 3.24)**	303	31.7	**1.78 (1.28, 2.47)**	454	33.5	**2.02 (1.52, 2.68)**
Traditional facility use												
No	448	17.9	1	713	17.1	1	486	24.7	1	673	25.3	1
Yes	17	47.1	**2.33 (1.06, 5.09)**	48	35.4	**2.26 (1.37, 3.72)**	29	55.2	**3.76 (2.07, 6.82)**	49	42.9	**2.47 (1.58, 3.87)**

% are factor specific
* adjusted for age

Table 5. Association of the human immunodeficiency virus (HIV) infection with self rated health according to age and sex.

	Age group (year)											
	15-24						25+					
	Male			Female			Male			Female		
Residence	Total	%	OR (95%CI)	Total	%	OR (95%CI)	Total	%	OR (95%CI)	Total	%	OR (95%CI)
Rural												
HIV infection												
Negative	165	18.2	1	195	23.1	1	262	35.1	1	296	43.9	1
Positive	10	20.0	[a] 1.13 (0.22, 5.69)	38	26.3	0.95 (0.42, 2.19)	62	50.0	**2.29 (1.26, 4.18)**	60	41.7	1.06 (0.59, 1.90)
			[b] 0.68 (0.10, 4.48)			0.86 (0.35, 2.10)			**2.20 (1.18, 4.12)**			1.15 (0.62, 2.13)
			[c] 0.67 (0.08, 5.45)			0.58 (0.22, 1.54)			**1.93 (1.03, 3.63)**			0.98 (0.51, 1.88)
Urban												
HIV infection												
Negative	402	17.2	1	543	17.5	1	256	18.8	1	399	21.6	1
Positive	29	20.9	[a] 1.28 (0.64, 2.56)	158	23.4	**1.43 (1.02, 2.00)**	151	38.4	**2.44 (1.69, 3.53)**	230	33.5	**2.39 (1.75, 3.26)**
			[b] 1.34 (0.67, 2.69)			1.29 (0.90, 1.86)			**2.52 (1.68, 3.78)**			**2.44 (1.75, 3.41)**
			[c] 1.21 (0.60, 2.45)			1.18 (0.81, 1.73)			**2.19 (1.44, 3.35)**			**2.20 (1.55, 3.13)**

% are factor specific
[a] adjusted for age
[b] adjusted for age, sociodemographic factors and self perceived HIV risk
[c] adjusted for age, sociodemographic factors, self perceived HIVrisk, mental depression and health care use

(95% CI 1.55, 3.13) times more likely to rate their health status as poor compared to female respondents who were not HIV infected. Mental distress and health facility utilisation accounted for a 9.8% reduction in the impact of HIV infection on SRH among females of age more than 24 years in an urban area.

The impact of HIV infection on SRH according to five-year age groups for urban males and females is shown in Figure 1. The impact of HIV infection on SRH in the urban area among males was greatest in the age groups 30-34 and 35-39 years, while that for females was in the age groups 25-29 and 30-34 years.

DISCUSSION

There are few studies on self-ratings of global health from African populations and no previous study has been found which examines the influence of HIV infection on such ratings. We studied the impact of HIV infection on self-rated health status in a high-prevalence population where the HIV-related knowledge was relatively high but where only a small proportion of infected persons had been tested for HIV infection and thus are likely to be aware of their HIV status. The main finding was that HIV infection had a significant independent impact on self-rated health in those aged >24 years. This age-specific diversity in impact fits well with established epidemiological knowledge that most infections in the younger age groups have occurred recently and thus might have a limited effect on the immune system compared with older age groups where the bulk of infections are older. Accordingly, self-rated health seems to be a sensitive indicator of health-related changes directly linked to HIV when the infection has reached a stage subsequent to significant immune system changes.

Non-response bias in this survey can either be due to refusal (refused to give a saliva sample for anonymous HIV testing) or absence (not found at home after two follow up visits to the household). Refusal was relatively low; i.e. 6%, and no difference by sex, and it seems that the use of saliva can reduce refusal to a very low level compared with reports from population-based surveys applying blood-based testing (21). Absence was the main cause of non-response among men, however, the total response rate among men was 71% compared with 92% among women (18). We have previously reported that mobility was not associated with HIV infection in this survey (22). There was no clear pattern in the association between mobility and self-rated health, and this might indicate non-response bias due to absence to be limited. Perceiving their own risk of being HIV infected as high might lead to a higher likelihood of refusal, and we found a clear pattern of self-perception of risk of HIV infection to reduce self-rated health. Although the magnitude of this bias is likely to be limited due to the low refusal, any effect will be in the direction of reducing the association between HIV infection and self-rated health.

Self-rated health is assumed to represent a summary statement of how various threats related to own health or life stressors are perceived by the individual. Our survey was conducted in a context of different ethnic and language groups. The main challenge was in agreeing on proper translations of the term "health". It is likely that there are cultural differences in the way health is conceptualised and thus having different meanings. However, the findings from this study on determinants of self-rated health were in agreement with consistent findings from the wealthy literature in this regard. This includes both depression and health care use (7-10,12). Studies from Norwegian populations showed self-rated health as the main independent determinant of health care seeking (1,23). There was no consistent pattern in our findings regarding the relationship between educational attainment and self-rated health, and this is in accordance with previous findings (1,23).

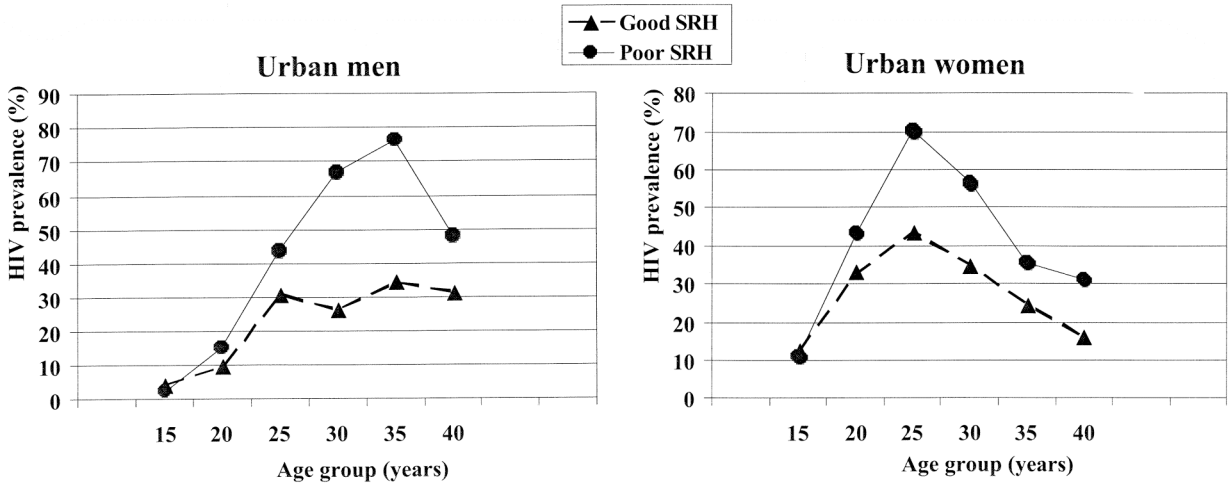

Figure 1. HIV prevalence by self-rated health.

As a possible explanation of the independent effect on mortality, Idler and Benyamini suggested in their comprehensive review of research on self-rated health, that negative assessments of health may stimulate the neurological system in ways that compromise the immune system (1). In a study on acceptability to voluntary HIV counselling and testing (VCT) we found self-rated health to be the most powerful factor explaining readiness for VCT in those aged >24 yeas and not in the younger (17). Our suggestion was that in a high prevalence rate of HIV infection setting like in Zambia, people might perceive declining health as a likely sign of HIV infection which in turn leads to higher readiness for finding out their HIV status. The present analysis is in support of this suggestion, that self-rated health is a sensitive marker of declining health caused by HIV infection. The age-specific differential in the effect of HIV is per se strengthening this observation since the bulk of HIV infections in the young people are relatively recent.

In order to improve the poor self-rating of health among mentally distressed persons, it is critical that prevention and interventions are instituted early. This will in turn facilitate the development of effective coping strategies for people living with HIV that require positive self-rated health (24). At the individual level there are huge differences in terms of time from infection to the immune system is "seriously" affected and thus experienced as illnesses that in turn affect health perceptions. In this regard, and based on the present findings, self-rated health might have a diagnostic value, as a proxy of "HIV disease" being of practical relevance particularly in high prevalence populations.

In summary, our findings represent a valuable addition to the wealthy literature, mainly from high-income countries, on the importance of self-rated health as a sensitive marker of health declines by adding evidence from African settings with high prevalence rates of HIV infection and health perceptions being related to HIV infection. The relevance of this measure of peoples' health should be evaluated, e.g. for use as a proxy in support, care and treatment services for HIV infected.

ACKNOWLEDGEMENTS

We thank participants, research assistants, the staff at the Central Statistical Office in Lusaka, the staff at the Department of Virology, University Teaching Hospital, Lusaka; and the staff at the National AIDS/STD/TB and Leprosy Programme. The study was supported by the Norwegian Agency for Development cooperation (NORAD), the NUFU programme "Strengthening HIV-related interventions in Zambia: cooperation in research and institution capacity building", and the University of Bergen.

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