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Full Length Research Paper

Impacts of HIV/AIDS on Secondary School Science Teachers and Learners in Namibia

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Namibia's secondary school science teachers and learners are critical to the success of the country's science, technology, engineering, and mathematics renaissance project. However, due to the high prevalence of HIV, there are fears that they may succumb to AIDS. Despite the eminent threats of HIV/AIDS on science education, there are no specific data that speak to the impacts of HIV/AIDS on science teachers and learners. In this cross-sectional study, data on the perceptions of HIV/AIDS impacts were collected from 829 secondary school science learners and 61 science teachers located in 18 schools from six education regions. The results showed that the perceived death of secondary school science teachers due to putative HIV/AIDS illnesses was low. But the perceived mortality of science teachers due to AIDS-related conditions was significantly high in the Kavango and Omusati regions. Science learners perceived to be coping with HIV/AIDS exhibited stress and poor concentration in class. With the advent of free antiretroviral therapy, the study found that the perceptions of HIV/AIDS were in transition from quantitative (mortality) to qualitative (stress) impacts. This finding points to a paradigm shift in our perceptions of HIV/AIDS impacts on education and calls for interventions to manage HIV/AIDS-related stress in schools.

Key words: HIV/AIDS impacts, secondary school, science, teachers, learners.

INTRODUCTION

Access to Science and Technology (S & T) is the key driver to a knowledge economy in post-apartheid Namibia (Tjikuua, 2000). Namibia's desire for S & T is resolutely stated in the government's Vision 2030 document: "The vision for education and training provides for a strong general education base in science and technology" (GRN, 2004, p.30) and "a high rate of enrolment in science and technology courses at all levels" (GRN, 2004, p.31). Vision 2030 also provides for the establishment of a University of Applied Science and Technology, and plans to harness S & T in such a way that citizens as a whole truly share in its progress and benefits.

To implement the S & T project, the Namibian government under the Ministry of Education set up the Directorate of Research, Science, and Technology to act as a policy hub to coordinate and popularize S & T activities, enhance capacity, and draw up legal instruments (Kasanda and Chinsembu, 2009). Under the Namibian Ministry of Education's Education and Training Sector Improvement Programme (ETSIP), efforts to strengthen institutional and financing frameworks to facilitate S & T are in progress (ETSIP, 2010). In line with ETSIP, the national policy on research, science and technology as well as the policy on biosafety and biotechnology were adopted by Cabinet in 1999. The Research, Science and Technology Act was enacted in 2004 (ETSIP, 2010). The Act provides for the National Commission on Research, Science and Technology and the National Research, Science and Technology Fund. ETSIP also contains plans to create the Centre for Innovation, Entrepreneurship and Technology.

Furthermore, in terms of relevance, there is a renewed focus on science and mathematics at basic and secondary levels, and on science and technology at tertiary level, including the pre-service training of teachers

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(GRN, 2004). Thus, government encourages the teaching and learning of secondary school science subjects such as Life Science, Biology, Physical Science and Mathematics (Tjikuua, 2000). At college and university levels, government pursues programmes to produce more S & T graduates in all the critical sectors of the national economy. At the University of Namibia, the Faculty of Engineering and Information Technology opened to students in the northern town of Ongwediva in January 2008, while the first intake into the School of Medicine started in January 2010. All these efforts demonstrate that Science, Technology, Engineering, and Mathematics (STEM) have now been embraced as the silver-bullet solution to Namibia's deficit of S & T skills and lack of industrial development.

Notwithstanding the aforementioned efforts, there is need to transcend the public excitement for STEM, to think ahead, and forecast attention on the Namibian secondary school. This is because the secondary school is the most important 'human factory' and foundation for the entire national STEM project. Going forwards, it is crucial to situate and contextualize secondary school science education within the harsh realities of life in Namibia. Specifically, we argue that in the current health and socio-economic set-up, efforts to expand secondary school science education may be a nullity because science teachers and learners may succumb to HIV/AIDS. This argument has also received support from development agencies who warned that Namibia's human development gains emanating from increased investment into education would be eroded by the HIV/AIDS epidemic (UNDP, 2000).

Projections are that HIV/AIDS is a putative threat to science education in Namibia. For example, the UNDP predicted that HIV/AIDS would make Namibia lose a quarter to a third of its workforce by 2020 (UNDP, 2000). Other reports also estimated that about 20% of teachers would be lost between 2002 and 2010 due to HIV/AIDS (Abt Associates, 2002); and over one quarter of Namibia's investment into education could be lost through premature AIDS illness and deaths among learners (Abt Associates, 2002). However, both UNDP and Abt Associates' survival models were computed at a time when there was a paucity of free antiretroviral therapy (ART) for HIV/AIDS patients.

Notwithstanding the authenticity of these HIV/AIDS impact estimates and the current roll-out of ART, the argument that HIV/AIDS is a bona fide threat to the Namibian government's renewed focus on secondary school science education is still compelling. With an overall HIV prevalence rate of 18.8% of the adult population (Katuta, 2011), coupled with observations that 50% of deaths among persons aged 15-19 years of age are attributable to AIDS (Family Health International, 2008), the reading is that Namibia may lose the human resource base required to launch and sustain the national STEM renaissance project.

Undoubtedly, the vicious impacts of AIDS on science education are undeniable when viewed against the backcloth of HIV prevalence rates among Namibian teachers and learners in general. Rogers et al. (2010) found that 14.4% of Namibian teachers (15.0% females and 12.0% males) self-reported that they were HIV-positive. This means that 2,880 teachers out of the country's approximately 20,000 teacher population were infected with HIV. The proportions of HIV-positive teachers varied across age groups: 3% (<25 years old), 6% (25-29 years old), 14% (30-39 years old), 19% (40-49 years old), and 18% (>50 years old).

"Percentages of HIV-positive teachers also varied by region: 24%, Omusati; 20%, Oshikoto; 19%, Oshana; 16%, Kavango; 14%, Ohangwena; 12%, Caprivi, Kunene, and Omaheke; 11%, Erongo; 10%, Otjozondjupa; 7%, Khomas; 6%, Karas; and 5% Hardap (Rogers et al., 2010). Teacher death rates per annum averaged 1.5% between 2000 and 2002, with higher rates of 2.0% in northern regions of Namibia (Abt Associates, 2002). This death rate translates into the mortality of 400 teachers per year. Among school-age children in the north-western region of the country, 10% of the learners were HIV-positive (Gonzales, 2000). By 2009, 50.0% of all deaths among Namibian children under the age of five were attributable to HIV-related conditions (Kaiser Daily HIV/AIDS Report, 2009).

The afore figures contend that without effective interventions, Namibian education in general and science education in particular would crumble under the heavy burden of HIV/AIDS infections among teachers and learners. Already, HIV/AIDS has compounded the problems of teacher absenteeism, attrition, and turnover (GRN, 2008b). Teacher absenteeism is mostly due to chronic sick leave (46.3% of all leave) and funeral attendance (31% of all leave) (GRN, 2008a). There is evidence that demand for relief teachers is increasing due to a combination of factors including HIV/AIDS (GRN, 2008a).

In response to the eminent threats of HIV/AIDS on Namibian education, the then Ministries of Basic Education, Sport and Culture, and Higher Education, Training and Employment Creation set up the HIV/AIDS Management Unit (HAMU) in 2003 (UNESCO, 2008a). One of the functions of HAMU was to create a decentralised Education Management Information System (EMIS) for capturing, analysing and monitoring HIV/AIDS impacts (UNESCO, 2008a). But routine EMIS data do not often provide adequate information to guide planning and allow interpretation of trends in a period of growing changes and uncertainties due to HIV/AIDS (Abt Associates, 2002). More non-routine data are required to inform planning and monitoring of HIV/AIDS impacts. Other workers also advised against a holistic and aggregated study of the educational system. Boler (2003) cautioned that teachers are not a homogenous group; therefore data on HIV/AIDS impacts should be disaggregated as much as possible, in both time and space.

Thus, HIV/AIDS impact analysis should target different sub-groups of teachers in different ways.

Despite the need to study different sections of the Namibian educational sector, there are no specific data (to the researchers' knowledge) that speak to the impacts of HIV/AIDS on science teachers and learners at the secondary school level. Against this backdrop, the current study was undertaken as a modest effort to un-derstand the putative impacts of HIV/AIDS on secondary school science teachers and learners in Namibia.

MATERIALS AND METHODS

Ethical approval

Permission to conduct the research was obtained from the Senate Post-graduate Studies Committee of the University of Namibia. Authorization to collect data in schools was obtained from the Permanent Secretary of the Ministry of Education in Windhoek. In the regions, the go-ahead to visit the schools was obtained from the Regional Directors of Education. At the schools, teachers and learners were informed that they were free not to participate in the study.

Study and sampling designs

A randomised cross-sectional survey design was used. We used a cross-sectional design because it allowed a 'one-off' collection of data (snap-shot) from a representative group of the population. A three-stage sampling design was applied. The primary sample included six education regions: Caprivi, Kavango, Ohangwena, Omusati, Oshikoto, and Khomas. These regions were purposively selected because their HIV prevalence rates were >15%. The secondary sample consisted of eighteen randomly selected government-run secondary schools: three secondary schools in Caprivi, three secondary schools in Kavango, three secondary schools in Ohangwena, four secondary schools in Omusati, two secondary schools in Oshikoto, and three secondary schools in the Khomas.

Secondary schools were randomly selected with probability proportional to the population of schools in the region. The names of the schools are known but are hereby withheld due to ethical considerations, as well as to avoid stigmatization. Within the selected schools, one Life Science or Biology class was randomly selected and all learners in the selected class were eligible to participate in the study. All Life Science and Biology teachers at the schools were also invited to participate in the study.

Demographic characteristics of science learners and teachers

A total of 829 learners and 61 teachers participated in the study. The mean age of the learners was 16.96 ± 0.06 years, standard error. The learners' median age was 17 years. The ages of the teachers ranged from 23 to 52 years, with a mean age of 31.62 ± 0.95 years, standard error. The teachers' median age was 32 years. Their working experience ranged from 0.65 to 29 years of service, with a mean (± S.E) of 7.22 ± 0.86 years. Population characteristics of the learners and teachers are summarized in Tables 1(a) and 1(b).

Data collection and analysis

Data were collected between October and November, 2009. In order to reduce intimidation of learners, teachers were requested to leave the classroom immediately after the researchers were introduced to the learners. After obtaining their verbal consent, learners and teachers were requested to complete separate questionnaires without personal identifiers. Thus, the data collection procedure followed the ethical principles of voluntary and informed participation, confidentiality, respect, anonymity and non-harm.

The validity of the questionnaires to measure the perceived impacts of HIV/AIDS on science teachers and learners was extrapolated from the Health Belief Model (HBM) (Rosenstock, 1966, 1990). The HBM states that perceptions, rather than facts, are more important in predicting health-related behaviours including sick roles. Teacher and learner questionnaires were piloted at a known secondary school in Katima Mulilo, Caprivi region.

In the learner questionnaire, the main outcome variables were: "in the past two years, have you lost a science teacher due to perceived HIV/AIDS-related illness?" and "what characteristics would you associate with a science learner perceived to be trying to cope with HIV/AIDS?" In the teacher questionnaire, the main outcome variable was "what characteristics would you associate with (a) a science learner, and (b) a science teacher perceived to be trying to cope with HIV/AIDS?"

Data in questionnaires were coded and entered for analysis into the Statistical Package for the Social Sciences (SPSS) software (PASW Statistics 18) version 18 (SPSS Inc., 2010). Cross-tabulations of the proportions were performed and Pearson Chi-square analysis was done to reveal significant or non-significant differences against independent variables such as education regions. Means for the regional frequencies of learners were calculated and one-way analysis of variance (ANOVA) was done to differentiate the most cited or least cited characteristics perceived to be associated with HIV/AIDS. Scheffe's post-hoc test was used to rank the means.

RESULTS

Learners' perceptions of the impacts of HIV/AIDS

Only 10% of learners in the whole study reported that they had lost a science teacher due to perceived HIV/AIDS-related illnesses. However, there were significant regional differences (Pearson Chi-square value = 16.51, df = 5, $p < 0.006$) in the percentage frequencies of learners that reported losing a science teacher due to putative HIV/AIDS-related illnesses: 4.9% from the Oshikoto region; 5.3% from the Khomas region; 7.8% from the Caprivi region; 8.3% from the Ohangwena region; 14.3% from the Kavango region; and 15.1% from the Omusati region. Therefore, learners from the Omusati and Kavango education regions reported the highest losses of science teachers due to alleged HIV/AIDS-related conditions.

The regional counts and percentage frequencies of learners that cited various characteristics of learners perceived to be coping with HIV/AIDS are presented in Table 2. There were significant regional differences in the proportions of learners that cited specific characteristics perceived to be associated with HIV/AIDS. "Poor class performance" was more significantly cited by learners in the Ohangwena region (57.9%) than in the Kavango region (34.3%). "Absent from school most times" was more significantly reported by learners in the Oshikoto

Table 1a. Population characteristics of learners that participated in the study.

Variable	Counts, {N (%)}
Region	
Caprivi	103 (12.4)
Kavango	140 (16.9)
Khomas	166 (20.0)
Ohangwena	108 (13.0)
Omusati	208 (25.1)
Oshikoto	104 (12.5)
Location of school	
Rural	420 (50.7)
Urban	409 (49.3)
Gender	
Male	365 (44.1)
Female	462 (55.9)
Ethnic group	
Damara-Nama	30 (3.6)
Herero	29 (3.5)
Kavango	123 (14.8)
Lozi	114 (13.8)
Ovambo	514 (62.0)
Others (Basters, Coloureds, non-Namibians)	19 (2.3)
Learners' grades	
Grade 9	301 (36.4)
Grade 11	527 (63.6)

region (55.3%) than in the Omusati region (30.5%). "Looks tired" was cited by a statistically higher proportion of learners in the Ohangwena region (57.0%) than in the Omusati region (31.0%). "Poor concentration in class" was mostly reported in the Ohangwena (63.6%), Oshikoto (62.1%) and Caprivi (61.8%) regions than in the Omusati region (37.0%).

Table 2 also shows that "looks stressed" was most significantly reported in the Caprivi (63.7%), Ohangwena (63.6%), and Oshikoto (62.1%) regions than in the Khomas region (44.0%). "Fails to attend after-school activities" was mostly reported by Oshikoto (46.6%) and Caprivi (45.1%) learners than their peers in the Omusati region (25.8%). "Looks sick" was a major characteristic of learners perceived to be coping with HIV/AIDS in the Caprivi region. "Often comes late to school" was more significantly reported in the Caprivi region (34.3%) than in the Omusati region (18.0%).

In all the regions, "poor concentration in class" and"looks stressed" were the most commonly reported characteristics of science learners perceived to be coping with with HIV/AIDS while the least reported characteristics were "withdraws from other learners" and "often comes late to school" (ANOVA F-value = 16.61, df = 12, $p < 0.000$) (Table 3).

Teachers' perceptions of the impacts of HIV/AIDS

Table 4 shows the counts and percentage counts of teachers that cited various characteristics perceived to be associated with HIV/AIDS among learners. Pearson Chi-square analysis showed that the percentage frequencies of teachers that cited all the characteristics associated with learners trying to cope with HIV/AIDS were the same across education regions (Table 4). However, Pearson Chi-square analysis revealed that "looks stressed" was more frequently reported by urban (n = 17, 94.4%) than rural (n = 27, 62.8%) teachers (Pearson Chi-square value = 6.32, df = 1, $p < 0.012$). "Poor class performance" was more frequently mentioned by urban (n = 17, 94.4%) than rural (n = 30, 69.8%) teachers (Pearson Chi-square value = 4.37, df = 1, $p < 0.037$). "Bullied and teased by other learners" was more frequently reported by Biology (n = 14, 60.9%) than Life Science (n = 13, 34.2%) teachers (Pearson Chi-square value = 4.13, df = 1, $p < 0.042$).

Table 1b. Population characteristics of teachers that participated in the study.

Variable	Counts, {N (%)}
Region	
Caprivi	10 (16.4)
Kavango	10 (16.4)
Khomas	7 (11.5)
Ohangwena	15 (24.6)
Omusati	8 (13.1)
Oshikoto	11 (18.0)
Location of school	
Rural	43 (70.5)
Urban	18 (29.5)
Gender:	
Male	25 (41.0)
Female	36 (59.0)
Ethnic group	
Himba	1 (1.6)
Damara-Nama	1 (1.6)
Herero	1 (1.6)
Kavango	9 (14.8)
Lozi	10 (16.4)
Ovambo	34 (55.7)
Others (Non-Namibians)	5 (8.2)
Subjects taught	
Life Science	44 (72.1)
Biology	23 (37.7)
Life Science and Biology	8 (13.1)
Marital status	
Married	16 (26.2)
Single	45 (73.8)
Qualifications	
Certificate	1 (1.6)
Masters' degree	2 (3.3)
Postgraduate Diploma	3 (4.9)
Bachelors' degree	17 (27.9)
Diploma	38 (62.3)

The counts and percentage counts of Life Science and Biology teachers that cited putative characteristics of HIV/AIDS among science teachers are shown in Table 5. The most cited characteristics of science teachers affected by HIV/AIDS were "absent from work most of the time because of sickness" (91.7%), "looks stressed" (68.3%), "poor performance at school" (68.3%), and "seeks treatment elsewhere" (66.7%). "Looks thin" (28.3%) and "retired on medical grounds" (31.7%) were the least reported characteristics.

However, "retired on medical grounds" was more significantly reported by male (n = 11, 45.8%) than female (n = 8, 22.2%) teachers (Pearson Chi-square value = 3.71, df = 1, $p < 0.054$). Pearson Chi-square analysis revealed no significant regional and rural-urban differences in the percentage frequencies of teachers that cited the various characteristics of science teachers trying to cope with HIV/AIDS (Table 5).

Table 2. Characteristics of learners perceived to be coping with HIV/AIDS in different regions.

Characteristics of learners coping with HIV/AIDS	Regions						Pearson chi-square value (*P*-value)
	Caprivi (n = 103)	Kavango (n = 140)	Khomas (n = 166)	Ohangwena (n = 108)	Omusati (n = 208)	Oshikoto (n = 104)	
	{Number of learners that cited characteristic (%)}						
Poor class performance	56 (54.9)	48 (34.3)	74 (46.5)	62 (57.9)	76 (38.0)	56 (54.4)	25.21 (p < 0.000)
Absent from school most times	53 (52.0)	61 (43.6)	75 (47.2)	55 (51.4)	61 (30.5)	57 (55.3)	25.62 (p < 0.000)
Looks tired	52 (51.0)	61 (43.6)	68 (42.8)	61 (57.0)	62 (31.0)	42 (40.8)	23.21 (p < 0.000)
Poor concentration in class	63 (61.8)	66 (47.1)	75 (47.2)	68 (63.2)	74 (37.0)	64 (62.1)	33.96 (p < 0.000)
Looks stressed	65 (63.7)	68 (48.6)	70 (44.0)	68 (63.6)	73 (36.5)	64 (62.1)	38.55 (p < 0.000)
Fails to attend after-school activities	46 (45.1)	46 (32.9)	53 (33.3)	40 (37.4)	51 (25.8)	49 (47.6)	19.83 (p < 0.001)
Looks sick	57 (55.9)	59 (42.1)	66 (41.5)	53 (49.5)	69 (34.5)	47 (45.6)	15.09(p < 0.010)
Often comes late to school	35 (34.3)	30 (21.4)	42 (26.4)	28 (26.2)	36 (18.0)	28 (27.2)	11.46 (p < 0.043
Withdraws from other learners	30 (29.70	34 (24.3)	37 (23.3)	27 (25.2)	30 (15.0)	24 (23.3)	10.27 (p > 0.068)
Bullied and teased by other learners	30 (29.4)	44 (31.7)	48 (30.2)	37 (34.6)	45 (22.5)	38 (36.9)	8.97 (p > 0.110)
Looks hungry	30 (29.4)	32 (22.9)	44 (27.8)	31 (29.0)	38 (19.0)	33 (32.0)	9.18(p > 0.102)
Completely stops attending school	31 (30.4)	43 (30.7)	36 (22.6)	22 (20.6)	47 (23.5)	32 (31.1)	7.24(p > 0.203)

Within regions, calculated % frequencies may differ from expected % frequencies due to missing values.

Table 3. Ranking of characteristics exhibited by science learners perceived to be coping with HIV/AIDS.

Characteristics of learners trying to cope with HIV	Mean* ± SE
Poor concentration in class	54.1 ± 4.4^{a}
Looks stressed	53.1 ± 4.7^{a}
Poor class performance	47.7 ± 4.0^{ab}
Absent from school most times	46.7 ± 3.6^{abc}
Looks sick	44.8 ± 3.0^{abc}
Looks tired	44.4 ± 3.6^{abcd}
Fails to attend after-school activities	37.0 ± 3.3^{abcd}
Bullied and teased by other learners	29.2 ± 1.7^{bcd}
Completely stops attending school	27.3 ± 1.8^{bcd}
Looks hungry	25.6 ± 2.0^{cd}
Often comes late to school	25.6 ± 2.3^{d}
Withdraws from other learners	23.5 ± 1.9^{u}

*Mean of six regions; means ± SE with same letter are not significantly different according to Scheffe's post-hoc test, p = 0.05.

Table 4. Teachers that cited perceived characteristics of science learners trying to cope with HIV/AIDS in different education regions.

Characteristics of learners trying to cope with HIV/AIDS	Counts	Counts (%)	Pearson Chi-square values for regions, df = 5, (p-values)
Poor concentration in class	54	88.5	4.20 (p > 0.520)
Absent from school most times	49	80.3	5.35 (p > 0.374)
Poor class performance	47	77.0	5.13 (p > 0.400)
Looks stressed	44	72.1	9.18 (p > 0.102)
Withdraws from other learners	43	70.5	8.98 (p > 0.110)
Easily drops-out of school	35	57.4	6.06 (p > 0.300)
Looks tired	34	55.7	5.49 (p > 0.358)
Fails to attend after-school activities	30	49.2	7.67 (p > 0.176)
Looks sick	28	45.9	8.37 (p > 0.137)
Bullied and teased by other learners	27	44.3	1.60 (p > 0.904)

Counts may give different percentages due to missing values.

Table 5. Teachers that cited perceived characteristics of science teachers trying to cope with HIV/AIDS in different education regions and rural-urban areas.

Characteristics of teachers trying to cope with HIV/AIDS	Counts	Counts (%)	Pearson Chi-square values for regions, df = 5, (p-values)	Pearson Chi-square values for rural-urban, df = 1, (p-values)
Absent from work most of the time because of sickness	55	91.7	4.61 (p > 0.466)	0.187 (p > 0.666)
Looks stressed	41	68.3	9.19 (p > 0.102)	0.056 (p > 0.813)
Poor performance at school	41	68.3	3.06 (p > 0.690)	0.144 (p > 0.704)
Seeks treatment elsewhere	40	66.7	5.31 (p > 0.380)	2.01 (p > 0.156)
Easily gets annoyed	32	53.3	5.43 (p > 0.365)	0.375 (p > 0.540)
Looks absent-minded	30	50.0	2.53 (p > 0.772)	0.082 (p > 0.774)
Produces poor results in student examinations	29	48.3	2.51 (p > 0.775)	0.015 (p > 0.901)
Is very forgetful	27	45.0	5.73 (p > 0.334)	0.140 (p > 0.708)
Seeks early retirement	27	45.0	6.39 (p > 0.270)	0.604 (p > 0.437)
Transfers to a school in town	25	41.7	5.47 (p > 0.361)	0.002 (p > 0.961)
Coughing	25	41.7	2.64 (p > 0.775)	0.284 (p > 0.594)
Retired on medical grounds	19	31.7	7.08 (p > 0.215)	0.144 (p > 0.704)
Looks thin	17	28.3	1.80 (p > 0.877)	0.014 (p > 0.907)

Counts may give different percentages due to missing values.

DISCUSSION

This study found that the perceived impacts of HIV/AIDS on the supply of science teachers were low. This was evidenced by the fact that only 10.0% of learners in the whole study perceived the loss of a science teacher due to putative HIV/AIDS-related illnesses. In essence, the results showed that the supply of science education, over a two-year period, was probably jeopardised for not more than 10.0% of the science learners. The low perception of putative HIV/AIDS-related losses of science teachers may be due to low HIV infection rates among this sub-group of teachers. However, it may also have meant that the quantitative impacts of HIV/AIDS were not yet visible, either because infected teachers were in the incubation period before the onset of AIDS, or because of the ameliorative power of ART.

On the other hand, since significantly higher proportions of learners in the Omusati (15.1%) and Kavango (14.3%) regions reported the loss of science teachers due to putative HIV/AIDS-related illnesses, the perceived impacts of HIV/AIDS on science teachers in these two regions may be higher than the perceived impacts in other regions. These results mirrored recent data that Omusati and Kavango regions had some of the highest percentages of HIV-positive teachers, 24.0 and 16%,

respectively (Rogers et al., 2010).

The most significantly perceived characteristics of learners putatively infected or affected by HIV/AIDS were poor concentration in class and stress. Therefore, apart from other external factors, stress and poor concentration in class were the two most important factors that would negatively affect the quality of science education among the learners. HIV/AIDS-induced stress and poor concentration significantly affected learners in the Caprivi, Ohangwena, and Oshikoto regions. These three regions had some of the highest HIV/AIDS prevalence rates in Namibia (GRN, 2008b).

Stress was a common feature of Namibians living with HIV/AIDS (Plattner and Meiring, 2006). HIV/AIDS also negatively affected the psychological well-being of those living with HIV/AIDS or those that cared for sick family members. For the carers of sick family members in the Caprivi region, HIV/AIDS was also associated with stigma, low self-esteem, tension, and low personal or household productivity (Thomas, 2006). Coombe (2002) also stated that HIV/AIDS impacts on the emotional status of educators and young people. She observed that both educators and learners have difficulty concentrating in the face of illness, death, mourning, and dislocation. Many learners affected by the presence of HIV/AIDS had a widespread sense of anxiety, confusion and insecurity.

Some of the learners that exhibited stress may have been orphans. Zimba (2003) observed that in the context of HIV/AIDS, some orphans experience and live through long periods of their parents' pain and illness. Due to this, they suffer from depression, anxiety and hopelessness as they grieve before their parents' death. After the death of their parents, some orphans are stressed even further when everything that offered them comfort, security and hope for the future is taken away from them (Zimba, 2003).

Statistically more urban learners exhibited HIV/AIDS-related stress and poor class performance. Several factors may have led to this trend. It was reasoned that harsher ecological conditions in urban environments could have exacerbated stress among HIV/AIDS-affected learners. For example, the lack of social support systems from relatives and neighbours, coupled with hardships in securing shelter, food, water, electricity, and transport, could have led more urban HIV-affected learners to be stressed. Communal help and support can lessen HIV/AIDS-related hardships and stress. Such communal support was more forthcoming in rural than urban settings. Therefore, HIV/AIDS-related hardships were probably lessened in rural areas where there was a communal social support system of relatives and neighbours. The finding that poor class performance was more prevalent among urban learners also demonstrated that urban schools and teachers had not adapted their environments and services to suit the needs of learners coping with HIV/AIDS.

Among secondary school learners, there was an evident swing in the perceptions of HIV/AIDS from physical (that is, quantitative factors such as deaths and absenteeism) to psychological (that is, qualitative factors such as stress, and loss of concentration in class) impacts of HIV/AIDS. This evidence points to a paradigm shift in the perceptions of HIV/AIDS impacts on secondary school learners. UNESCO (2008b) examined the specific challenges faced by the education system in responding to the needs of HIV-positive learners in Namibia. One of the difficulties highlighted in the UNESCO report was access to ART. Be that as it may, our results suggest that the management of HIV/AIDS should not just be about ART but must also include behavioural interventions that reduce stress and raise learners' attention in class. Overall, our results illustrated that learners infected or affected by HIV/AIDS were a vulnerable group that required novel interventions from their families, communities, teachers, and schools.

The results also showed that significantly more Grade 11 than Grade 9 teachers reported bullying and teasing of learners that were affected by HIV/AIDS. This finding may have meant that teasing and bullying were more prevalent among HIV/AIDS-affected learners in Grade 11 than Grade 9. Thus, older learners were more likely to engage in bullying and teasing than younger learners. In Namibia, maltreatment of children from AIDS-affected families was common and included practices such as avoidance, teasing and neglect. In case studies in Haiti and Brazil, HIV-infected teens reported violence and peer-fighting in schools as a response to teasing about their HIV status (USAID and UNICEF, 2008). Bullying and teasing hindered infected persons from getting tested and therefore delayed the onset of ART.

In this study, absenteeism was a common feature among teachers infected or affected by HIV/AIDS. Many Namibian school principals reported upward trends in teacher absenteeism due to funeral attendance (Abt Associates, 2002). In the Caprivi region, 40% of school principals cited funerals as the most common reason for teacher absenteeism (Abt Associates, 2002). However, the main causes of absenteeism were teacher illness (55%), followed by funeral attendance (23.0%), and sick leave at 3% frequency (Abt Associates, 2002). In 2002, many teachers did not have free and universal access to ART.

Poor performance and stress were the second most cited attributes of science teachers that coped with HIV/AIDS. A study by Abt Associates (2002) found evidence of poor quality of teaching by chronically-ill teachers. They found cases where sick teachers continued to teach even when they were incapacitated. Informants reported that such ailing teachers performed poorly for more than a year before they died (Abt Associates, 2002). Significant anxiety and stress of infected and affected Namibian teachers were also reported by Abt Associates (2002). They reported that stress emanated

from grief, extra workloads, stigma, fear of personal infection or illness, and care of family members. Consequently, science teachers infected or affected by HIV/AIDS were likely to compromise the quality of science education and concomitantly contributed to poor learner examination results.

"Looks thin" and "retired on medical grounds" were the least perceived features of teachers that were coping with HIV/AIDS (Table 5). In the early years of the HIV/AIDS epidemic, posters usually painted persons suffering from HIV/AIDS as emaciated human beings. But our results suggest that body wasting may no longer be a highly perceived characteristic of teachers infected by HIV/AIDS. In the Caprivi region, we found that ART had dramatically improved the body weight of emaciated teachers to such an extent that the putative effects of AIDS were difficult to perceive. ART had also lessened the retirement of teachers on medical grounds. It was argued that with the advent of ART, the perception of AIDS as the 'slimming' disease was probably in transition. Thus, contemporary Namibian teachers probably no longer perceive AIDS as a condition associated with body wasting.

The design of the study was cross-sectional, and although some associations between variables were logical, cross-sectional designs limit causal inferences.

CONCLUSION AND RECOMMENDATIONS

Although previous studies alluded to the eminent threats of HIV/AIDS on Namibia's education sector in general, such studies did not specifically focus on the linkages between HIV/AIDS and secondary school science teachers and learners. This study was a modest but inaugural effort to quantify the perceived impacts of HIV/AIDS on science education in Namibia. The main putative impacts of HIV/AIDS on science teachers were absenteeism, poor performance, and stress. Overall, the putative impacts of HIV/AIDS on science teacher losses due to perceived AIDS-related illnesses were low. However, losses of science teachers due to perceived HIV/AIDS-illnesses were more apparent in the Omusati and Kavango regions. Overall, the study showed that secondary school science learners were more significantly affected by psychological (stress) than physical (illness) impacts of HIV/AIDS. Putative HIV/ AIDS-related stress and poor concentration in class were significant qualitative attributes that reduced the quality of learning. We conclude that with the advent of free ART, the impacts of HIV/AIDS on science teachers and learners have now been transformed from quantitative losses of mortality and attrition to more qualitative attributes of stress and poor performance at school.

We recommend that the Ministry of Education should revise the HIV/AIDS education curriculum in order to include life skills that help secondary school learners and teachers to deal with the impacts of HIV/AIDS. Education authorities should also devise policies and interventions to reduce HIV-related stress among teachers and learners. More detailed qualitative research is required to understand the putative impacts of HIV/AIDS on science teachers, learners, and the quality of secondary school science education. Specifically, there is an urgent need to understand the apparently high perception of science teacher losses due to putative HIV/AIDS-related illnesses in the Omusati and Kavango regions.

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REFERENCES

Abt Associates (2002). The impact of HIV/AIDS on education in Namibia. (Consultancy report). Windhoek: Abt Associates Inc.

Boler T (2003). Approaches to examining the impact of HIV/AIDS on teachers. Policy and Research Series 1, UK working group on education and HIV/AIDS.

Coombe C (2002). Mitigating the impact of HIV/AIDS on education supply, demand and quality. Florence: UNICEF. Available at: http://www.hivpolicy.org/ Library/HPP001135.pdf.

Education and Training Sector Improvement Programme ETSIP (2010). Knowledge creation and innovation. Windhoek: Ministry of Education. Available at: http://www.etsip.na/docs/ knowledge_creation_web.pdf.

Family Health International (2008). Youth Net Country Program: Namibia. http://www.fhi.org/NR/Shared/enFHI.

Gonzales MC (2000). Re-educating Namibia: The early years of radical education reform, 1990-1995. Africa Today, 47: 105-124.

Government of the Republic of Namibia GRN (2004). Namibia Vision 2030. Policy framework for long-term national development, Windhoek: Office of the President. pp. 30-31.

Government of the Republic of Namibia GRN (2008a). Relief teacher strategy workshop discussion paper. Proposed relief teacher strategy to improve routine system management and mitigate the impact of HIV and AIDS in the education sector. Draft 1, Windhoek: UNICEF/EDUSector AIDS Response Trust/USAID.

Government of the Republic of Namibia GRN (2008b). Report of the national HIV sentinel survey. Windhoek: Ministry of Health and Social Services.

Kaiser Daily HIV/AIDS Report (2009). HIV/AIDS hindering Namibia's progress in improving child health. Friday, April 10. http://www.kaisernetwork.org/daily_reports/print_report. cfm?DR_ID=57960&dr_cat=1.

Kasanda CD, Chinsembu KC (2009). Challenges facing science in higher education and research institutions in Africa. In The challenge of change in Africa's higher education in the 21st century, (Eds. Mwenda, K.K. & Muuka, G.N.). Amherst, New York: Cambria Press, pp. 263-292.

Ministry of Health and Social Services Namibia & Macro International, Inc. (2008). Namibia demographic and health survey 2006-07: key findings. Calverton, Maryland, USA: MoHSS and Macro.

Rogers SJ, Ucello A, Sommerfelt E (2010). Final report on the April 2008 knowledge, attitudes, practices and behaviours (KAPB) survey with Namibian teachers. Washington, DC: Namibia Equip 2 PEPFAR Project/ Academy for Educational Development.

Rosenstock IM (1966). Why people use health services. Milbank Memorial Fund Q., 44: 94-124.

Rosenstock IM (1990). The health belief model: explaining health behaviour through expectancies. In Health behaviour and health education, Eds. Glanz K, Lewis FM, Rimer BK . San Francisco: Josey-Bass. pp. 39-62.

Statistical Package for the Social Sciences SPSS Inc (2010). PASW Statistics 18 version 18 for windows user's guide. Chicago: SPSS Inc.

Thomas F (2006). Stigma, fatigue and social breakdown: exploring the impacts of HIV/AIDS on patient and carer well-being in the Caprivi Region, Namibia. Soc. Sci. Med., 63: 3174-3187.

Tjikuua CU (2000). Science education reform in Namibia. In April 2000 workshop report on secondary science education for development. Washington: World Bank.

United Nations Development Programme [UNDP] (2000). Namibia Human Development Report. Windhoek: UNDP.

United Nations Educational, Scientific, and Cultural Organization [UNESCO] (2002). UNESCO Science report, Africa. Paris: UNESCO.

United Nations Educational, Scientific, and Cultural Organization UNESCO (2008a). EDUCAIDS technical briefs. Paris: UNESCO.

United Nations Educational, Scientific, and Cultural Organization UNESCO (2008b). Supporting the educational needs of HIV-positive learners: lessons from Namibia and Tanzania. Windhoek/ Dar es Salaam: Raison Namibia/TAMASHA.

United States Agency for International Development [USAID], United Nations Children's Fund UNICEF (2008). The evidence base for programming for children affected by HIV/AIDS in low prevalence and concentrated countries. New York: Quality Assurance project/USAID/Health Care Improvement project/UNICEF.

Zimba RF (2003). Community support for the education of orphans and other vulnerable children in Namibia. In B. Otaala (Ed.), Government leaders in Namibia responding to the HIV/AIDS epidemic (), Proceedings of a workshop held from June 23-24, Safari Court Hotel, Windhoek, Namibia: University of Namibia Press, pp. 170-191.