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ORIGINAL ARTICLE

THE TREND OF HIV/AIDS RELATED MORTALITY AMONG PRIMARY AND SECONDARY SCHOOL TEACHERS IN ADDIS ABABA, ETHIOPIA: USING A VERBAL AUTOPSY METHOD

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ABSTRACT

Background: *It is widely argued that school teachers in sub-Saharan Africa are being affected and will continue to be affected by the AIDS epidemic. Teachers are considered as a high-risk group with respect to HIV/AIDS, particularly in high prevalence countries, where the epidemic has devastating impact on the teaching profession*
Objective: *The aim of this study was to examine the trends of mortality among primary and secondary school teachers in Addis Ababa during this era of HIV/AIDS.*
Methods*:* Data on teachers who died from November 2005 to October 2012 retrospectively and a longitudinal data for the new deaths during the year followed prospectively (November 2012 to October 2013) were included in the trend analysis. *The data were obtained from family members or care givers of 146 deceased teachers. Each completed verbal autopsy questionnaire was reviewed by two physicians independently. When assigned causes for deaths of teachers by two physicians were not in agreement, then the cases were given to a third physician/Internist/. Cases with inconsistent causes of deaths by three physicians were labeled as "undetermined". Extended Mntel-Haenszel Chi-square for linear trend was used to check the significance of the trend by using SPSS version 20 and Open EPI software.*
Results: *The trend of total and HIV-related mortality among teachers declined from 45 (31%) to 22(15.2%) and 15 (10.3%) to 4(2.7%) during the first two years /Nov.2005-Oct.2007/ and the last two years /Nov.2011- Oct.2013/of the study period, respectively. Similarly, the proportionate mortality ratio between the total and HIV/AIDS related mortality declined from 0.33 to 0.18 during the corresponding period. The decline in the HIV/AIDS related mortality was statistically significant with Mantel Haenszel Chi-square=7.04(P<0.01).*
Conclusions: *The findings of this study demonstrated a statistically significant decline in total and HIV/AIDS related mortality among teachers in Ethiopia in the last 8 years . However, we suggest nationwide study on the impact of HIV/AIDS in the education sector for more representative data and better interventions.*
Keywords: Primary and Secondary, Schools, Teachers, Trend, Mortality, HIV/AIDS, Ethiopia

INTRODUCTION

HIV/AIDS strikes people at the prime of their lives [1]. Every day, 4,900 people die from HIV/AIDS and other 7,100 people are infected with the HIV virus [2]. There were an estimated 2.3 million new HIV infections with 1.6 million AIDS deaths worldwide in the year 2012 [3].

Africa has been hit harder by HIV/AIDS than any other region in the world. Two-thirds of people living with HIV/AIDS and three-quarters of deaths from HIV/AIDS are in sub-Saharan Africa [4]. In developing countries, as reported by WHO, the existing challenges of communicable diseases, such as HIV/AIDS and Tuberculosis, are worsened by the changes in socioeconomic, behavioral and lifestyle factors among their population [5]. For instance, the findings of a study conducted in Addis Ababa, Ethiopia, showed that non–communicable diseases caused about half of the total adult deaths [6].

HIV/AIDS is the leading cause of death in sub-Saharan Africa and the fourth largest killer worldwide. Among the victims of the pandemic are teachers, health workers, and farmers. The epidemic forced the closure of schools and clinics and threatened food security in the most infected and affected parts of the world [7]. HIV-related deaths are complex to count, since HIV positive individuals are frequently affected by other diseases as a result of being immunologically compromised.

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However, verbal autopsy (VA) has become a widely established approach for characterizing cause of death in settings where individual deaths are not routinely certified as a cause, with a variety of methods being used for both interview and interpretation phases [8]. It is widely argued that school teachers in sub-Saharan Africa are being affected and will continue to be affected by the AIDS epidemic. Teachers are considered a high-risk group with respect to HIV/ AIDS, particularly in high prevalence countries, where the epidemic has devastating impact on the teaching profession [9].

According to a report from Tanzania, the country lost 9.1% of its educators due to HIV and AIDS in 2005 [10]. A study conducted in South Africa on the impact of HIV/AIDS on the teaching profession determined that 12.7% of educators were HIV positive and that the prevalence was highest in the age group 25–34 years [11, 12]. The result of a cross-sectional survey on the impact of HIV/AIDS on primary and secondary education in Botswana showed that over 50% of deaths of teachers in 1999 were due to both short and long duration illnesses. Mortality rates are the highest among married and those in the age group 26-40 [13].

Another cross-sectional survey of schools in Namibia reported an increasing occurrence of illness and deaths among younger teaching staff with an average loss of 1.5% teachers in two years [14]. Ethiopia is one of the hardest hit sub-Saharan African countries by the HIV pandemic. As in other Sub-Saharan countries, the education sector is being severely affected by the HIV pandemic. A 5% increase in death amongst teachers in Ethiopia has been noted between1999 –2001 and some of which can be attributed to AIDS [15].

A cross sectional study that was done in Addis Ababa, Ethiopia, disclosed HIV/AIDS related illnesses were the leading causes of death which accounted for 47.9% all deaths among teachers in Addis Ababa [16]. In Zambia, death rates among teachers due to various causes had risen to 3.9 per cent by the late 1990s and it was reported to be 70% higher than in the general population [17]. However, data from a recently completed study of secondary education in Zambia shows that teacher mortality rates due to HIV/AIDS and other causes are in fact much lower than most other occupational groups [18].

A survey that was undertaken in 2003 on primary and secondary school teachers in Malawi showed annual mortality rates of less than 1.0 percent though the trend was upward at the rural secondary schools. Among primary school teachers, mortality rates have been much higher, but appear to have peaked in 1999 and 2000 [19].

In Botswana the impact of HIV/AIDS epidemic on the overall staff of the Ministry of Education was believed to be very high. Higher morbidity and mortality, especially among experienced and well-qualified teaching staff was a major organizational challenge [13]. Nevertheless, higher mortality rate was observed among married male teachers compared with single male teachers, and the opposite was true among female teachers. In addition, large differences were observed between primary and secondary school teachers mortality rates [13].

In sub-Saharan Africa, cumulative teacher deaths between 2000 and 2015 are projected to be around 120,000, which is one-third of the total number of teachers employed in 2000. Two-thirds of teachers deaths are AIDS-related and the estimated rates of AIDS related mortality are therefore, 3-4 times higher than the actual rate. Similar divergences between projected and actual teacher mortality have been found in other high-prevalence countries in Africa [20].

However, the mortality rates of teachers from all causes did not exceed one percent even in Southern African countries with the highest adult HIV prevalence rates during 2003-2004. Although, the mortality rates among teachers in Malawi and Zambia were around two percent, in some eastern African countries that are believed to be hardest hit by HIV/AIDS, it didn't exceed one percent (Tanzania, Uganda and Kenya) [21].

On the other hand, there are very limited studies on the impact of HIV and AIDS in education sector of sub-Saharan countries in general and their respective teachers mortality and morbidity in particular. Moreover, even at this relatively late stage of the epidemic, our understanding of how HIV/AIDS is affecting the education sector in sub-Saharan Africa is generally poor.

Furthermore, there was a critical research gap in Ethiopia concerning the effects of HIV/AIDS on the education sector in general and on teachers mortality in particular. Even though there are very few researches, they are out-dated and may mislead the intervention strategies of the policy makers and donor agencies. Thus this study attempts to assess the trends of HIV/AIDS related mortality among primary and secondary schools teachers in Addis Ababa.

MATERIALS AND METHODS

The study assessed all deaths among teachers in selected public primary and secondary schools retrospectively from November 2005 to October 2012 and prospectively from November 2012 to October 2013. According to the national census of 2007, the projected population of Addis Ababa for the year 2012 was 3,048,631 and among those, 52 .4% were female [22]. The capital city is administratively divided into ten sub-cities (Kifle- Ketemas) and one hundred and sixteen districts /Woredas/ [23]. There were 745 primary and 163 secondary schools (both government and non-government) in Addis Ababa. The number of teachers for the year 2012/2013 were 14,893(44.4 % female) and 5,651(82.8% male) in primary and secondary schools respectively [24].

Among the public schools in Addis Ababa established before 2005 and have forty and more teachers during the study period, 76 primary schools with grades 1-8 were randomly selected and all the 27 secondary schools with grades 9-12 were included in the study. As mortality data on the trend of effects of HIV/AIDS and related behavioural factors on causes of mortality among teachers are lacking in Ethiopia, it was vital to apply a verbal autopsy method to generate the envisaged information.

A verbal autopsy questionnaire was adapted to a local situation from a standardized WHO and international network of field sites with continuous demographic evaluation of populations and their health in developing countries (INDEPTH Network) verbal autopsy questionnaires [25-28]. The questionnaire had several sections with various socio demographic, communicable diseases including HIV/AIDS, non-communicable diseases, maternal causes and other health related behavioral variables. It was primarily prepared in English language and then translated into Amharic language for its actual administration.

Verbal Autopsy data of all deceased teachers from November 2005 to October 2012 retrospectively and from November 2012 to October 2013 prospectively were collected from all the selected primary and secondary schools using the WHO standardized and interviewer-administered adult VA questionnaire. The data were obtained from the family members and/or other care givers of the deceased teachers [27-28]. The questionnaire was pre- tested in four (2 primary and 2 secondary) schools not selected for the actual data collection. Then, the required corrections in language and content were done for better clarity and more understandability. The data collections were conducted by trained 8 diploma holder nurses under the supervisions of two senior health professionals and the principal investigator. A four-day training was given to all data collectors and supervisors by the principal investigator.

The training for data collectors focused on the objective of the study, content of the questionnaire and skills of interview. The full addresses of the contact person or family members of the deceased teachers were clearly identified from the respective schools by the supervisors and principal investigator before the actual VA data collection. Then, a pair (male and female) of trained interviewers were deployed by tracing the home address of the deceased to collect the required data. Each interview lasted between 35 to 50 minutes. To maintain the quality of the data, close supervisions and weekly meetings were conducted.

Each completed verbal autopsy questionnaire was reviewed by two physicians independently for assigning the likely causes of deaths. When the assigned causes for the deaths of deceased teachers by two physicians were not in agreement, then the cases were given to a third physician/Internist/. The cases with inconsistent assigned causes by three physicians were labeled as “undetermined”. The completed teachers’ VA questionnaires with assigned physician diagnosis were analyzed. After data were entered into Epi-Info software version 3.5.4 for cleaning, it was transported to SPSS software version 20.0 for analysis.

Descriptive statistics such as frequencies and proportions were used to describe the study population in relation to the relevant variables. Cross tabulation of variables were also done. HIV/AIDS proportionate mortality ratio was computed. The trend of deaths due to HIV/AIDS and total death over years was analyzed using Extended Mantel Haenszel Chi-square for linear trend test.

An ethical clearance was obtained prior to the study from the Institutional Review Board of the College of Health Sciences of the Addis Ababa University. Official letter of cooperation was written from the School of Public Health of the Addis Ababa University to the Addis Ababa City Administration Education Bureau, and subsequently the Education Bureau wrote letters to all the concerned bodies, including the target primary and secondary schools. Verbal consents were secured from all respondents after being fully informed about the study objectives and procedures. Furthermore, confidentialities were maintained.

RESULTS

Socio-demographic characteristics of the study population: Among the 150 deceased teachers, those whose addresses were identified and verbal autopsy questionnaires completed were 146 (97.0%). Of the study subjects 103(70.5%) were male. Nearly half of the deceased teachers 70(48.6%) were in their most productive and reproductive ages (20-45 years). One hundred and four (71.7%) and 119(81.5%) were married and Orthodox Christian religion followers, respectively.

Fifty six point two percent of the deceased teachers were Amhara by ethnicity. Regarding educational status of the participants, 109(75.2%) had diploma or certificate in different subjects. In addition, 108 (74.0%) were primary school teachers (**Table 1)**.

Forty seven point three percent of the total number of teachers deaths reported during the study period were due to communicable diseases (n=69). The HIV related proportionate mortality ratio was 22.6% with 95% confidence interval of (16.1%, 30.1%). Among assigned communicable diseases, tuberculosis and other lung infections were reported in 27 (18.5%). This shows that HIV/AIDS and tuberculosis with other lung infections were responsible for over 41% of teachers death in Addis Ababa, Ethiopia **(Table 2).**

Table 1: Socio-demographic Characteristics of deceased teachers (N=146) in Addis Ababa, Ethiopia, Nov. 2005-Oct 2013

Variables	Number of deaths	Percent
Sex		
Female	43	29.5
Male	103	70.5
Age		
20-35	18	12.5
36-45	52	36.1
46-55	31	21.5
56 and above	43	29.9
Marital status		
Single	28	19.3
arried	104	71.7
Others	13	9.0
Religion		
Orthodox	119	81.5
Protestant	14	9.6
Catholic, Muslim and others	13	8.9
Ethnicity		
Amhara	82	56.2
Oromo	26	17.8
Tigrie	23	15.8
Others	15	10.3
Education		
Certificate	41	28.3
Diploma	68	46.9
First degree	26	17.8
Second degree and above	10	6.8
Type of school		
Primary	108	74.0
Secondary	38	26.0

Table 2: Alcohol and smoking status in Relation to Major causes of deaths among Primary and Secondary School Teachers , Addis Ababa, Ethiopia, Nov.2005- Oct.2013

Causes of death	***Number***	***Drink Alcohol***		***Smoke cigarette***	
	n(%)	**Yes n(%)**	**No n(%)**	**Yes** n(%)	**No n(%)**
Communicable diseases	69(47.3)	47(68.1)	22(31.9)	31(44.9)	38(55.1)
HIV/AIDS related	33(22.6)	18(54.5)	15(45.5)	15(45.5)	18(54.5)
TB and other respiratory infections	27(18.5)	22(81.5)	5(18.5)	13(48.1)	14(51.9)
Non-communicable diseases	77(52.7)	43(55.8)	34(44.2)	22(28.8)	55(71.4)
Chronic Liver Disease/CLD/	16(11.0)	8(50.0)	8(50.0)	5(31.3)	11(84.6)
Hypertension	19(13.0)	12(63.2)	7(36.8)	6(31.8)	13(68.4)
Malignancy or cancer of all types	15(10.3)	6(40.0)	9(60.0)	3(20.0)	12(80.0)
Accidental injuries including road traffic accidents	13(8.9)	8(61.5)	5(38.5)	2(31.9)	11(31.9)
Cardiac and renal diseases	6(4.1)	4(66.7)	2(33.3)	3(50.0)	3(50.0)
Diabetes Mellitus	4(2.7)	0(0.0)	4(100.0)	0(0.0)	4(100.0)
Diarrheal disease	1(0.7)	1(100.0)	0(0.0)	1(100.0)	0(0.0)
Undermined causes	3(2.1)	3(100.0)	0(0.0)	2(66.6)	1(33.3)

Moreover, non-communicable diseases were responsible for 77(55.7%) of deaths among teachers during the study period. The main non-communicable diseases confirmed as causes of teachers' mortality were chronic liver diseases 16(11.0%), hypertension 19 (13%), malignancy or cancer of any type 15(10.3%), accidental injuries including road traffic accidents 13 (8.9%) and all other non-communicable diseases 11 (7.5%) (Table 2).

Alcohol use accounted for 68.1% among those whose causes of deaths were allocated to communicable diseases. Of those 26.1% and 31.9% of deaths were assigned as HIV/AIDS, and TB and other lung infections related. On the other hand, it was reported that 49.9% of teachers, who died due to various communicable diseases had been smoking cigarettes and among the diseases HIV/AIDS and TB with other lung infection share 26.1% and 18.8%, respectively.

The prevalence of alcohol use and cigarettes smoking among deceased teachers due to non-communicable diseases were 55.8% and 28.8%, respectively. The proportions of these health risk behaviors were among the assigned cases of chronic liver diseases (10.4% and 6.5%), hypertension (15.6% and 7.8%), and malignancy of any type (7.8% and 3.9%), respectively (Table 2).The overall mortality among teachers was 27(0.42%) in 2005/06 and 10 (0.14%) in 2012/13 (Table 3). The decline in overall mortality was statistically significant (MH Chi-Square=7.79, P<0.01). Furthermore, HIV/AIDS related deaths among teachers were 15(33.3%) during the first two years of the study period /Nov. 2005–Oct.2007/ and 4(18.1%) during the last two years of the study period /Nov.2011-Oct.2013/. The decline in death due to HIV was also statistically significant (MHChi-Square=7.04, P<0.01)(Table 3).

Table 3: Total and HIV/AIDS Related Deaths among Primary and Secondary School Teachers in Addis Ababa, Ethiopia; November 2005- October 2013; N=103 public schools

Year	Number of teachers per year	Number of deaths	Percent	Mantel-Haenszel summary OR	Deaths due to HIV/AIDS	Proportionate mortality ratio	Mantel-Haenszel summary OR
Nov.2005-Oct.2006	6,481	27	0.42	1	10	0.37	1
Nov.2006-Oct.2007	6,925	18	0.26	0.624	5	0.28	0.468
Nov.2007-Oct.2008	7,580	20	0.26	0.633	3	0.15	0.257
Nov.2008-Oct.2009	7,254	17	0.23	0.563	2	0.12	0.179
Nov.2009-Oct.2010	7,624	16	0.21	0.504	4	0.25	0.340
Nov.2010-Oct.2011	7,670	26	0.34	0.814	5	0.19	0.422
Nov.2011-	7,323	12	0.16	0.393	2	0.17	0.177
Nov.2012-Oct.2013	7,300	10	0.14	0.392	2	0.2	0.178
Total	**58,157**	**146**	**0.25**	**MH Chi-Square= 7.97 (P<0.01)**	**33**	**0.23**	**MH Chi-Square=7.04 (P<0.01)**

DISCUSSION

This study was conducted on the deceased teachers from public primary and secondary schools in Addis Ababa. As the findings in Table 3 show, there was about a twofold decrease in mortality rates among teachers when the first and the last two years data of the study period were computed.

The major causes of deaths among communicable diseases were HIV/AIDS and TB and other respiratory infections. Hypertension, chronic liver diseases, malignancy and accidental injuries had also significant contributions to teachers' deaths among causes assigned as non-communicable diseases. The findings are in agreement with the World Health Organization's statistics report of 2010 and the results of a verbal autopsy study done in Addis Ababa among general population [5, 6].

The deaths of teachers were more prevalent among those in their most productive and reproductive ages. Those findings are consistent with the results of studies done among teachers in Botswana and Namibia [13,14]. The effect of HIV/AIDS seemed to be more serious among married teachers. This is also consistent with studies conducted previously in another sub Saharan country [13].

The Verbal Autopsy data demonstrated that 22.6% of all deaths among primary and secondary school teachers was related to HIV/AIDS. This is the highest share compared with other reported communicable and non communicable causes of mortality. The leading role of HIV/AIDS for adult mortality was reported from various previous studies and the finding of this study is also in agreement with those [4, 7, 11]. However, this finding is much lower than the results of some other studies conducted in different sub-Saharan African countries including a study conducted in the same setting of Ethiopia before a decade [15-19].

Although the HIV/AIDS proportionate mortality ratio among teachers was high during the first two years of the study period (0.30), it declined by 40% during the last two years of this study period (0.18). This finding is also consistent with other studies that reported significant decline in HIV/AIDS mortality among general adult population and/ or specific occupations like that of teaching [18, 19, 21].

Finally, some health risk behaviors like alcohol drinking were found to be more prevalent among teachers deceased due to various communicable diseases including HIV/AIDS. These findings are in line with the results of other previous studies [5,6]

Conclusion: Despite some limitations related to poor practices on compiling teachers' data in the study setting, this study showed that the trend of HIV/ AIDS related mortality is declining in a significant number in Ethiopia.

This could be due to increasing access to life-prolonging anti-retroviral therapies and/or change in risky sexual behavior because of increased knowledge on HIV/AIDS. Moreover, evaluation of causes of death among teachers by verbal autopsy gave a better understanding about the major causes of death.

The study has also shown that alcohol drinking and cigarettes smoking were found to be more prevalent among deceased teachers in Addis Ababa.

Consequently, HIV/AIDS related interventions in the education sector should give due consideration to the strategies of controlling health risk habits besides sexual risky behaviors.

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