Full Length Research Paper

Are low economic status and gender inequality a driving factor for increased HIV and AIDS vulnerability among women? Evidence from Sudan

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To examine whether poverty along with its associated factors; low economic status and gender inequality, may predispose women in Sudan to an increased vulnerability to HIV infection. We employed data collected by the Sudan Household Health Survey in 2010. The analysis is restricted to 500 women of reproductive age (15 - 49 years). The proposed model was tested and modified using structural equation modelling. About 60% of the respondents had never acquired formal education and some had received education at primary school level with slightly less than 50% having knowledge on condom use. About 45.5% reported that their husbands were in committed or casual relationships with other women. The results confirmed a direct positive relationship between poverty and HIV, where the regression weight for poverty in the prediction of HIV is significantly different from zero at the 0.05 level (less than 0.001). The results add to the growing evidence that poverty and lack of empowerment place women at risk of contracting HIV. The key message for main actors in HIV sector in Sudan is to extend efforts in a manner that creates a balance between implementation of prevention and treatment interventions, without compromising vulnerability of women.

Key Words: HIV and AIDS, Sudan, Socio- economic Status, Gender Inequality, SEM, Vulnerability, SHHS.

INTRODUCTION

More than 34 million people worldwide live with HIV, of whom half are women (UNAIDS, 2012). Previous studies confirmed that poverty and HIV are strongly linked (Whiteside, 2002; Wojcicki, 2005; Tladi, 2006; Thabo, 2010; Gillespie et al., 2007; Robert and Swarup, 2010). Research over the years has shown a significant correlation between poverty and HIV and AIDS, where poverty increases vulnerability to HIV infection and in turn HIV aggravates poverty. Lopman et al. (2007) studied the link between HIV and the incidence of poverty in Zimbabwe and found that the largest decrease in HIV prevalence occurred in the higher wealth index groups. In contrast, a cross sectional study conducted in 8 countries in Sub-Saharan Africa (Kenya, Ghana, Burkina Faso,

Cameroon, Tanzania, Lesotho, Malawi, and Uganda) using the demographic health survey (DHS) data, Mishra et al. (2007) found a lower prevalence among poor people, and a higher prevalence among wealthier individuals. However, in spite of all this, the study concludes that there is still no clear correlation between low welfare status and HIV. Several studies (Gillespie and Kadiyal, 2005; Gupta et al., 2003), stated that in regards to HIV transmission women are at a disadvantage from a biological point of view, where male-to-female transmission of the virus is approximately two to four times more likely to occur than that from female-to-male. Willis (2002) supported this argument and indicated that this places women at a higher risk of infection per sexual contact. Gender inequality and poverty deprives women of their ability to fulfil their socially designated responsibilities, and therefore humbles them, and may drive them into sex work. Study conducted in Khartoum state (Capital of Sudan) in 2008

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found that 86.2 % of the female sex workers engaged in sex work due to financial constraints (Abdelrahim, 2010). Shelton et al. (2005) supported the viewpoint that the poor are vulnerable to sexual imposition because HIV prevalence is partly a function of deprivation, this can be deemed especially true for women. Coercions by older men as well as men having a multiple partners of concurrent sexual relationships ultimately draw young women into the possibilities of acquiring HIV infection (Kemboi et al., 2011). Masangala (2007) pointed out additional factors contributing to the spread of HIV among women, such as their economic and financial dependency on men. Further, Walker (2004) stated that most women were not sufficiently empowered with the ability to negotiate prevention and condom use with male partners, particularly in marriage, hence increasing their vulnerability to HIV infection.

Sudan has a total population estimated at approximately: 30,894,000 (Sudan Central Bureau of Statistics, 2008) and is classified as a low-income country with low HIV prevalence compared to many other African countries. From a comprehensive epidemiological and behavioural review of the HIV and AIDS situation in Sudan (SNAP, 2009), the overall HIV prevalence is estimated at 0.67% and is expected to increase to 2.3%by 2015. HIV in Sudan is predominantly transmitted through heterosexual intercourse (SNAP, 2010). The first case of AIDS in Sudan was reported in 1986, and since then the number of cases reported annually has increased to a total of 11,484 by the end of 2011. It has been a cause for concern that numbers of reported cases do not reflect the reality of the situation of the HIV and AIDS epidemic in the country and there exists a large gap between the figures reported nationally to those estimates provided by UNAIDS of 304,945 cases of HIV infection (UNAIDS, 2011). According to the epidemiological projection done by SNAP in 2009, about 72,665 women are estimated to be HIV positive, 5,779 children born to HIV positive mothers are themselves infected by HIV and a projection of 100,000 women are likely to be infected by HIV by 2014. According to SNAP (2010) mother to child transmission is one of the main HIV modes of transmission in Sudan. The overall number of mothers requiring prevention of mother to child transmission (PMTCT) services is estimated to increase from 7,547 in 2010 to 11,997 in 2014.

In comparison to men, Sudanese women are considered to be a disadvantage in their vulnerability to HIV infection in which a multitude of factors play a role. An example of this is the higher levels of poverty among women headed households which make up just over one-quarter of all households, as was demonstrated in the (SHHS, 2006). Among these households, 56.9% are below the poverty line compared to 48.1% of households headed by men. According to the most recent data compiled by UNDP (2012) regarding labour force participation, males constitute 38.3% while females contribute only 14.1% of the workforce.

Motivation and objective of the study

The HIV epidemic in Sudan is mainly concentrated among the most at risk populations (MARPs) such as female sex workers (FSWs) and their clients, as well as men who have sex with men (MSM). The individuals that make up the majority of these population groups were found to have descended poor resource settings and may have engaged in sex work in order to sustain themselves financially (Abdelrahim, 2010). According to Greener and Sarkar (2010), vulnerability to HIV is also associated with population mobility, a phenomenon that is widespread in Sudan due to a long standing civil war in addition to other factors that have caused great instability among some segments of the population of Sudan. In recent years there has been a significant improvement in the understanding of the impact of HIV on the society, and considerable progress made in the clinical management of HIV and AIDS in Sudan. However, the socio-behavioral and economic factors driving the HIV epidemic in Sudan are not so well understood (SNAP, 2010). Building upon this knowledge, the main objective of this paper is to examine whether poverty, determined by a low socio-economic status and gender inequality, render women in Sudan at a higher risk of acquiring HIV infection.

METHOD

This section gives a detailed account on the methodology utilized to conduct the study. It describes the rationale behind the research methods employed in this paper, and includes research design, the sampling procedure, methods of data collection as well as the analysis techniques used.

Research Design

The study employed data from the second round of the Sudan National Health Survey (SHHS) conducted in 2010, the first round of which had been completed in 2006. This survey was carried out between March to May of 2010 by the Federal Ministry of Health (FMoH) and the Central Bureau of Statistics in collaboration with different UN agencies operating in Sudan namely; UNDP, WHO, UNAIDS, UNFPA, USAID andWFP, in addition to other development partners including JIKA and PAPFAM. The main goal of this survey was to assess the progress made towards achieving the National Development Targets in addition to the Millennium Development Goals (MDGs), in addition to the formulation of policies that lead to improved livelihood of the people in Sudan. The survey design and tools were based on the multiple Indicator Cluster Survey (MICS) and Pan Arab Project for Family Health (PAPFAM) survey. The sample was derived from all 15 states of Sudan. Two-stage cluster sampling was used

Table 1. The CFA Report Summary for all Constructs in Women Structural Model.

Constructs	Item	Factor Loading	CR (Above 0.6) $(\sum K)^2/[\ (\sum K)^2+(\sum 1 - K^2)]$	AVE (Above 0.5) $\sum K^2/n$	Cronbach's Alpha ≥0.70
Poverty	Wscore	97	**0.867**	**0.767**	**0.807**
	Windex	98			
	Wweight	77			
HIV	HA8A	90	**0.950**	**0.794**	**0.933**
	HA8B	84			
	HA8C	93			
	HA11	76			
Eco. Status	CPO4	84	**0.810**	**0.521**	**0.807**
	WEmp	77			
	incsta	64			
	Fodsec	60			
Gender Ineq.			**0.890**	**0.540**	**0.889**
	FGOO	65			
	FG17	70			
	DVIA	84			
	DVIB	82			
	DVIC	80			
	DVID	75			
	DVIE	56			

Note: Wscore (Wealth score), Windex (Wealth index), Wweight (women's weight), The principal components analysis was performed by using the information derived from the ownership of the consumer goods, housing characteristics, water and sanitation, and other characteristics that were related to the household's wealth. Weights (factor scores) were assigned to each of the household assets. Each household was then assigned a wealth score based on these weights. The population of the household survey was then ranked according to the wealth score, and was then divided into five equal parts (quintiles), from the lowest (poorest) to the highest (richest). The wealth index captured the underlying long-term wealth through information of the household assets. HA8A, HA8B and HA8C (knowledge of transmission of HIV virus from mother to her child), HA11 (Avoid HIV virus transmission using condoms consistently during sexual intercourse), CP04 (ability to procure condoms), Wemp (employment status), incsta (income status), Fodsec (food security and consumption status), FGOO and FG17 (accept and encourage continuity of FGM), DVIA, DVIB, DVIC, DVIE (violence and abuse by husbands), DVID (sex negotiation).

used for sampling at each state. The survey consisted of five sets of questionnaires, with each addressing a specific topic, namely; household, women, men, children and food security.

Of the 15,000 households selected for the sample; 17,174 women and 16,448 men were identified for interviews. Of these, only 5,573 men agreed to participate in the interviews, yielding an overall response rate of 33.9%, while interviews with women yielded a response rate of 92% (SHHS, 2010). The present study selected a randomly purposive sample of 500 interviews out of those conducted with women, and the remainder were rejected due to missing or incomplete data. Ethical approval for the study was obtained from the National Health Research Ethics Committee of the Federal Ministry of Health in Sudan. The number of the office of approval from the ethics committee was nine members.
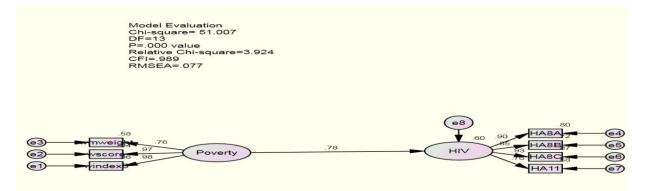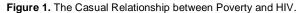
Statistical Analysis techniques

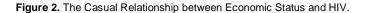The statistical analysis was performed using SPSS for Windows v20 (SPSS; Chicago, IL, USA) for descriptive analysis. This study used advanced statistical techniques, namely; Structural Equation Modelling (SEM) and Analysis of the Moment Software (AMOS) for analysing the causal link between vulnerability and risk of HIV in Sudan. SEM has been recognised as a combination of exploratory factor analysis and multiple regressions (James et al., 2006). Also, SEM assists in analysing complex theoretical models and allows construction of unobservable variables such as HIV, which need to be measured by multiple indicators or items. This permits testing and measurement of theoretical assumptions against empirical data.
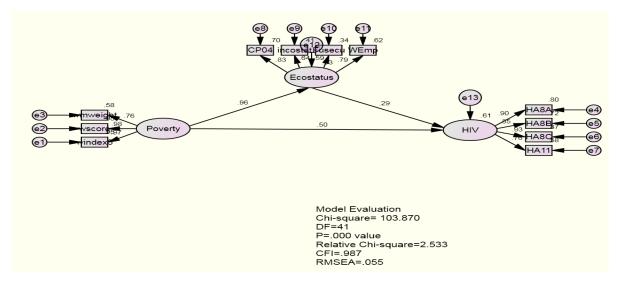
The Empirical Model

The model assumed that social and economic factors are important determinants in the spread of diseases such as HIV. The researcher aimed at modelling the mediating effect of gender inequality and economic status in linking the relationship between poverty and HIV in Sudan. The approach uses a series of regression models to test meditational hypotheses. Firstly; regressing the indepen-

Figure 1. The Casual Relationship between Poverty and HIV.

Figure 2. The Casual Relationship between Economic Status and HIV.

dent variables on the dependent variable, secondly; regressing the independent variable on the mediator variable, and then lastly, regressing the mediator variable on the dependent variable (Baron and Kenny, 1986). The construct of poverty was measured by wealth index, wealth and weight scores. The index has been shown to represent an internally-coherent, robust and comparable measure of poverty based on assets and services. This index was also found to perform better than the consumption expenditure index in explaining differences in educational attainment and attendance (Filmer and Pritchett, 2002). The economic status construct was measured by employment status, level of job satisfaction and income and food security. It also included purchasing power for buying condoms, a factor considered to be the most effective method in preventing HIV (Over, 1999). Gender variables comprised of different variables including; attitude towards domestic violence, Female genital mutilation (FGM), polygamy and sexual negotiations. The risk of HIV infection, measured at knowledge base, was taken as a proxy for behaviour. HIV variables included knowledge on modes of HIV transmission, HIV prevention and condom use. All the variables that were used to create the composite variable 'HIV knowledge', had four response categories: 'Yes', 'No', 'do not know' and 'not sure'. The respondents' knowledge on HIV was then scored on the following basis; "1" for answering 'Yes' indicating a risk to HIV, and "0" for answering 'No', indicating no risk to HIV.

Reliability and Validity of the survey data

The internal consistency of the two scale scores were estimated by Cronbach's alpha coefficient (Tavakol and Dennick, 2011), using SPSS software to test the indicators
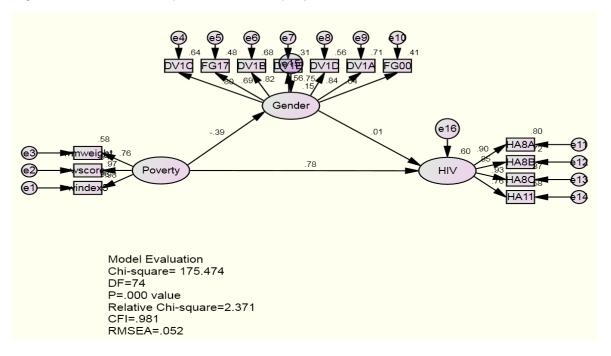
Figure 3. The Casual Relationship between Gender Inequality and HIV.

Model Evaluation
Chi-square= 175.474
DF=74
P=.000 value
Relative Chi-square=2.371
CFI=.981
RMSEA=.052

that measured the latent's construct. All the items that measured the four constructs scored more than 0.7. In addition, to measure the construct reliability, a value of CR ≥ 0.6 was required to achieve construct reliability. Furthermore, AVE (Average Variance Extracted), which measured the average percentage of variation explained by the items in a construct (≥ 0.6) was used. Moreover, all the items scored more than 0.6 (see Table 1). In brief, all the values of the individual constructs' reliability were sufficiently reliable for subsequent quantitative analyses.

Construct validity: Many authors (Marsh and Hocever, 1985; Bentler, 1990; Browne and Cudeck, 1993; Wheaton et al., 1977) argued that this validity is achieved when the fitness index for the model achieved the following requirements: Root Mean Square Error of Approximation (RMSEA) = 0.08 or less, Comparative Fit Index (CFI) = 0.90 or higher, Chisq/df of less than 5.0 and a P value of 0.000 (Figures 1, 2 and 3). This showed the measured model to be satisfactory.

RESULTS AND DISCUSSIONS

This section discusses in details the findings from the empirical model, in addition to the demographic and socio-economic characteristics of the respondents.

Demographic and socio-economic data Analysis

Statistical analysis was performed using SPSS for Windows v20 (SPSS; Chicago, IL, USA). The results

showed that slightly less than 50 percent of the participants were classified as poor and 50.2 percent were urban residents while 49.8 percent lived in rural areas. All of the respondents were between 15 to 49 years of age and represented all fifteen (15) states of Sudan. The majority of participants (52.6%) were currently married, 36.8 percent of the respondents had no formal form of education and 54.2 percent were unemployed (see Table 2).

Relationship between Poverty and HIV

Figure 1 shows that, the fitness index for the model achieved the validity requirements. Table 3 indicates that the probability of getting a critical ratio as large as 21.729 in absolute value is 0.000, which is less than 0.001. From this probability value we can establish that the regression weight for poverty in the prediction of HIV is highly significant, as the difference from zero is at the 0.05 level (two-tailed). The analysis confirmed that wealth was unlikely to have a significant effect on the results. The study provides empirical evidence that there is a significant positive direct relationship between poverty and HIV infection.

Relationship between Low Economic Status and HIV

The fitness index for this model achieved the validity requirements, thus this model is suitable for the analysis (see Figure 2). Table 4 shows that the probability of getting a critical ratio of 1.267 in absolute value in 0.205. Signifying that the regression weight for economic status

Table 2. Summary of the Respondents Characteristics Women (Sample size 500).

Variables	descriptive	Frequencies	Percentage
Area	Urban	251	50.2%
	Rural	249	49.8%
Age	15 – 19	101	20.2%
	20 – 24	79	15.8%
	25 - 29	83	16.6%
	30 - 34	70	14%
	35 – 39	74	14.8%
	40 – 44	56	11.2%
	45 - 49	36	7.2%
Education	None	184	36.8%
	Primary	116	23.2%
	Secondary	168	33.6%
	University	32	6.4%
Marital status	Formerly married	263	52.6%
	Divorced	28	5.6%
	Widowed	13	2.6%
	Never married	196	39.1%
Employment status	Currently not employed	271	54.2%
	Inconsistent job	8	1.6%
	Temporarily employed	23	4.6%
	Currently employed	44	8.8%
	Employed	154	30.8%
Wealth Index	Poorer	229	45.6%
	Middle	74	14.8%
	Fourth	94	18.8%
	Rich	104	20.8%

Table 3. Testing The Casual relationship between poverty and HIV.

Relationship		Estimate	S.E.	C.R.	P-value	Result
HIV	◄------- **Poverty**	0.777	0.036	21.729	***	Significant
Windex	◄------- **Poverty**	1.000				Significant
Wscore	◄-----**Poverty**	1.056	0.018	58.636	***	Significant
Wwight	◄-------**Poverty**	0.126	0.005	25.324	***	Significant
HA8A	◄------- **HIV**	1.000				Significant
HA8B	◄------- **HIV**	0.942	0.036	26.317	***	Significant
HA8C	◄------- **HIV**	1.038	0.032	32.413	***	Significant
HA11	◄------- **HIV**	0.866	0.039	22.025	***	Significant

in the prediction of HIV is not significantly different from zero at the 0.05 level (two-tailed). This indicates that statistically, low economic status had no effect on the link between poverty and HIV. This suggests that Sudanese women in general are vulnerable to HIV, not only those from poor segments of the society. It was found that these results were consistent with the findings from a similar study previously carried out in 8 Sub-Saharan countries, which found that, there is a reduction of HIV prevalence among people of low resource settings, and a higher prevalence among those from wealthier resource settings (Mishra et al., 2007). This indicating that women from different strata of the societies were vulnerable to HIV, hence leading to the conclusion that the infection was not restricted to underprivileged women only. The most interested findings showed that women in general, irrespective of their socio- economic status are still more vulnerable to the disease.

Table 4. Testing of the Casual Relationship between Economic Status and HIV.

Relationship		Estimate	S.E.	C.R.	P-value	Result
Economic Status ◄ Poverty		0.935	0.033	28.161	***	Significant
HIV ◄------- Economic status		0.302	0.236	1.267	0.205	Not Significant
HIV ◄--------- Poverty		0.503	0.225	2.237	0.026	Significant

Table 5. Testing of the Casual Relationship between Gender Equity and HIV.

Relationship		Estimate	S.E.	C.R.	P-value	Result
Gender ◄------- Poverty		-0.311	0.036	-8.554	***	Significant
HIV ◄--------- Poverty		0.779	0.039	20.125	***	Significant
HIV ◄-------- Gender Inequality		0.007	0.045	0.156	0.876	Not Significant

Relationship between Gender Inequality and HIV

Figure 3 shows that, the fitness index for this model achieved the construct validity requirements to carry out the analysis. Table 5 shows that the probability of getting a critical ratio of 0.156 in absolute value is 0.876. Meaning the regression weight for gender inequality in the prediction of HIV is not significantly different from zero at the 0.05 level (two-tailed). This indicates that from a statistical point of view, gender inequality does not have effect on the link between poverty and HIV. The study suggests that, it is not only poverty that put women to increase vulnerability to HIV, but it is the combination of poverty, social, cultural and structural factors that exposed women to HIV risk due to sexual behavioural practices. Women are much more likely than men to tolerate violence, sexual abuse and lack of power in sex negotiation, particularly, young women (WHO, 2013).

DISCUSSION

Several studies discussed the socio-economic and socio-cultural parameters that influenced women's sexual behaviour and vulnerability to HIV infection (Masangala, 2007; Doyal and Anderson, 2005; Dowsett, 2003; Gillespie and Kadiyal, 2005; Mastro and Vincenzi, 1996; Lugalla et al., 1999, Georgine et al., 2011). These key parameters are poverty and gender inequality. Poverty increases women's vulnerability to HIV risk. The results from these studies indicated that women, due to poverty, either engaged in sex work or took on multiple sex partners. The studies also showed that women had less power to negotiate sex with their husbands or partners. The analysis from the present study shows a significant direct relationship between poverty and HIV. However, the present study established that the mediating factors (gender inequality and low economic status) do not have a statistically positive effect on the link between poverty and HIV, where the study indicated that women from all strata of the community were vulnerable to HIV and determined that the infection was not restricted to women from poor resource settings. Nevertheless, poverty was found to be a predictor for these mediating factors. Thus, this study suggested that poverty deprived women of gender equality, aggravated their likelihood towards dependency on men and decreased their chances of empowerment within the society. All these factors in turn increase women's vulnerability to HIV infection. The results suggest that women in Sudan are socially and economically dependent on their husbands for sustenance (SHHS, 2006), which ultimately renders them powerless. Women who fear abandonment by their spouses have a higher tendency to stay in risky or abusive relationships, in which they lack control over their sexual activity or ability to protect them from HIV transmission. Moreover, they are unable to leave their husbands, since this will take them away from their sole source of support on which they are completely reliant. In short, Sudanese women's vulnerability to HIV can be seen in a dependent context.

The findings from the present study show that the majority of women in the study were from poor resource settings, less educated and in most instances unemployed. This suggests that many factors such as the inability to negotiate safe sex, lack of money and social networks, in addition to lack of access to certain types of jobs, place these women at a higher risk to HIV infection. Divorced or widowed women, who had been completely dependent on their husbands, find themselves at a loss after the departure of their spouses and may turn to sex work in order to sustain themselves and their children financially. Due to the taboos associated with sex work within the Sudanese society, this may eventually lead to their marginalization, an example of which can be seen among the Tea Selling women in public areas who are frequented by men.   Tea sellers are considered vulnerable group to HIV infection in Sudan (SNAP, 2010). Moreover, according to the findings from the bio-behavioural survey conducted in Sudan in 2010, approxi-

mately 90 percent of female sex workers stated financial reasons as the main cause for their engagement in sex work (IBBS, 2013).

Gillespie, et al. (2007) clearly reported the relationship between poverty and food insecurity. He illustrated that food insecurity may lead women to engage in transactional sex to meet basic needs for themselves and their children. The study suggested that poor women are more likely to be faced with food insecurity and suffer malnourishment. In Sudan, malnutrition is widespread and nutrition is inadequate which is evident in the generalized low weight levels in the country, usually affecting children. According to UNDP (2012), at a national level, 32.2 percent of Sudanese children were underweight. Poor nutrition weakens the body's defence system and individuals become more susceptible to infection, which in turn weakens the efficiency of intake of nutrients, thus contributing further to the vulnerability of HIV infection (Nattrass, 2004).

It has also been documented that poverty increases the likelihood of women being exposed to Gender Based Violence, which violates basic human rights and increasing the susceptibility of women acquiring HIV infection. This situation is highly common and severe in many of the communities in Sudan, where women lack the necessary empowerment, and hence are unable to express their opinions and raise their voices in their own defense. This is particularly with their husbands, and the fact that information on sex and violence is difficult to obtain only complicates the situation further (Mohga, 2002). The powerlessness women in these societies feel especially in regards to negotiating safe sex and condom use with sexual partners also contributes to unsafe sexual practices (Myer et al., 2002). Another issue faced by some girls in Sudan is the, not so uncommon phenomenon, of forced early marriage, where the girls are at such a tender age that they are simply too young to make an informed decision about their marriage partner or about the implications of the marriage itself (Clark, 2004). About 52.5 percent of the women in the study reported that their husbands had another wife or partner. This study suggests that even in the context of marriage, especially in a place where formalised polygamy is widely practiced (SHHS, 2006), women may often become exposed to risky sexual behaviour through informal sexual network structures (Parikh, 2007).

Condom use in Sudan faces big challenges at the social, political and religious levels. The results show that 45.4 percent of the women in the study either do not know about condom use or have no access to condoms, an indication of the low levels of knowledge on HIV prevention and modes of protection. To date, condom use is the most effective means of avoiding HIV infection, in the absence of abstinence. Tladi (2006) argued that the risk of HIV infection is significantly reduced with consistent and correct condom use, even when the number of sexual partners is high. This argument was supported by Holmes et al. (2004) asserted that using condoms correctly and consistently will be the most effective method of prevention of HIV and a significant protective method for both men and women.

CONCLUSION

This paper concludes that poverty cannot be considered as a key factor for increased vulnerability to HIV, but still remains a critical factor. Although it is true that women from poor resource settings, are likely to be more stricken by the devastating impact of AIDS, their chances of being exposed to HIV are not necessarily much higher than for those women who are from wealthier settings.

Evidence from this study shows that, the majority of Sudanese women are vulnerable to HIV. High levels of poverty as a result of women's economic dependency on men, as well as their lack of empowerment within the society, are considered to be the main factors contributing to their vulnerability. Cultural norms and political factors also play a role in aggravating this vulnerability. In this regard, the concept of empowerment should be considered as a key factor in reducing women's vulnerability to HIV.

Arguments on risk and vulnerability are often concentrated on resource allocation and financial regulations (Greener and Sarkar, 2010). Thus, at the national level, any serious policy interventions aiming at controlling the prevalence of HIV and AIDS must incorporate strategies for empowering women. This can be done through improvements in income earnings, capacity building and removal of inequality in employment practices, which in the current state, unfairly excludes women from employment in some areas. Policy makers in Sudan need to support women's organisations, in particular those which are already campaigning for better access to land, property ownership and inheritance rights. Researchers should be encouraged to conduct research that aims to increase the effectiveness of income generation and outline was in which this can be achieved successfully. Strategies on micro-credit schemes should be supported and designed in a manner that will ultimately increase women's financial independence as well as ensure financial support for those who are unable to work.

The impact of spread of HIV and AIDS within polygamous marriages was found to be more fatal than when in monogamous relationships, even when men in the latter form are engaged in extra-marital sex. Polygamy may often become stigmatised and replaced with riskier and less formal sexual network structures. This study recommends that women be empowered on safe sex negotiation by providing them with the necessary skills and knowledge on safe sex practices, enabling them to protect themselves from HIV infection. Advocacy for women's rights should also become common

practice to ensure women are aware of their rights. The study outlines the dire need to address income issues as part of food security. The study also seeks to enhance condom promotion in Sudan in the context of prevention, this matter is considered as a top priority in the development and implementation of health programmes. The study attempts to provide a potential of contributing to both an improved policy development mechanism, as well as an actual transformation of gender relations in all strata of societies in Sudan.

The key message for policy makers in Sudan is the need to extend their efforts in order to facilitate creation of a balance between relying on prevention and treatment interventions without ignoring the vulnerability and its associated socio-economic factors. Finally, the model used is a promising tool to be used in the identification of socio-economic factors that expose women to HIV risk in the context of poverty.

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CONTRIBUTIONS OF THE AUTHORS

The first Author: Have made major contributions to conception and design, acquisition of data, and analysis and interpretation of data;

The second Author have been involved in drafting the manuscript and revising it critically for important intellectual content;

The Third Author have involved in drafting the manuscript and have given final approval of the version to be published

The Forth Author have involved in editing the manuscript and have given final approval of the version to be published.

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