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## SUFFICIENT KNOWLEDGE TOWARDS HIV/AIDS BY USING LOGISTIC REGRESSION MODEL: THE SOUTH SALAM VILLAGE CASE

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### ABSTRACT

This paper aim to study the South Sudanese population for their knowledge, attitudes & behavior towards HIV/AIDS. A descriptive cross-sectional community study was performed by the Adventist Department & Relief Agency (ADRA) in collaboration with Sudan Ministry of Health, Khartoum State, HIV/AIDS/STLs Control Programme, in South Salam Village household residents adults population, aged between 15 to 49 years, during the year 2016. The researcher was to find out the factors influencing the Sufficient Knowledge towards HIV/AIDS by using Logistic Regression Model. A structured pre-tested questionnaire was used as a main tool for data collection, as well as focus group discussions. By sampling, a complete coverage was performed and 823 persons from the village were interviewed. The Adult ratio of Male and female was nearly 1:1, the majority of the residents were Christians from South Sudan, with a high illiteracy rate & low Socio-economic status. More than half of them were married and had children. Their knowledge about HIV/AIDS as a disease was high (74.97%), but not actually accompanied by their attitude and behavioral changes. About 52% of the respondents had regular sexual partners, 22.98% had extramarital sexual relationships 2.94% of the males and 5.13% of the females were homosexual. Their knowledge about condoms and their usage was very low. The researcher concludes that there was a significantly evident that sufficient knowledge will increase the rate of sexual behavioral changers & those willing to care for infected persons. Also the study reveals that educational status influence on sufficient knowledge towards HIV/AIDS. This study showed an important association between sufficient knowledge and sexual behavior change. Also the study gives the descriptive statistics for the variables: age, sex, job, income, marital status, sexual partner, tattoo operations, alcohol, sedatives and using condom for all adult population aged 15-49 years in South Salam Village which represent as special region in Sudan that affected by the displacement and migration movement due to war in South Sudan.

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### INTRODUCTION

AIDS means the acronym for Acquired Immune Deficiency Syndrome, which was first recognized in Los Angeles. USA in 1981. The causal agent was identified in 1983 as being the Human Immunodeficiency Virus, known as HIV, which is a Ribonucleic Acid (RNA) retrovirus. This virus spreads through the blood, body fluids, semens, uterine cervical secretions & to a lesser extent through the placenta & the infected mother's milk. HIV virus affects the T-lymphocytes of the immune system & leaves the patient increasingly unable to resist certain infection & tumours that are particularly associated with AIDS. It is transmitted via homosexuals, heterosexuals, bisexuals, infected mother to her child, transfusion of infected blood other organic pollutants during the degradation process (Bernard, 2014) . Consequently, environmental concerns have prompted research into the development of the utilization of biodegradable polymer alternatives to petroleum based plastics. Among the



transmission of the disease (AIDS) in South Sudan. These include the lack of access to HIV prevention and care service, lack of awareness among the communities, polygamy, wife inheritance and traditional practices (COP, 2018; SSAC, 2020; UNAIDS, 2013).[4,7,8]

In recent years, there have been worrying rises in annual HIV infections and AIDS related mortality in key countries and entire regions. The largest reductions in annual HIV infections and AIDS-related deaths have occurred in the region hardest hit by the epidemic: eastern and southern Africa. Progress in the rest of the world, where HIV infections are predominantly among key populations, is considerably slower. The majority of global infections in 2018 were among key populations and their sexual partners.[4]

Due to the above mentioned facts and to create a base data line that motivates the national & international responses, AIDS study survey was conducted during 2016 to determine & document the knowledge, attitude & behavior of the adult population (aged 15 - 49 years) towards HIV/AIDS in South Salam village, Khartoum State, Sudan, which located on the border region of southern Sudan. This village was selected for this investigation because it had been considered of a high risk area probably because of the increasing displacement and migration movements. Moreover, this area has population with different ethical religious backgrounds and adopted behaviours[4]

## MATERIALS AND METHODS

This is descriptive cross-sectional community based study. The study area is South Salam village which has been planned & allocated by the government to accommodate the influx of displaced persons. The village lies near Jabal Awlia town, 40 kilometers south of Khartoum center. It has been designed to accommodate a total number of 3800 families. The target group for this survey were adult (aged 15 to 49 years) of both males & females, in South Salam village. This age range covers people in their most sexually active years. While risk of HIV infection obviously continues beyond the age of 50, the majority of those who engage in substantial risk behaviors are likely to be infected by this age. The 15 – 49 years range were used as the denominator in calculating the adult HIV prevalence[4].

By intentional sampling, a total coverage was performed & 823 individuals were interviewed. Data collection tools were structured pretested questionnaire of the National AIDS Control Programme[1]. The questionnaire consists of four section demographic characteristics, adults behavior, knowledge towards HIV/AIDS, & attitudes & practices. As per the World Health Organization (WHO), it is considered that anyone who knows any three causes or preventive methods for HIV/AIDS, as having sufficient knowledge about AIDS[4].

Data analysis was performed by using the logistic Regression Model, with a binary variable as a dependent variable that consist of two categories.

Logistic Regression is defined as Generalization of Chi-Squared Test to examine the linear association of binary dependent variables with one or more independent variables (Binary or categorical or continuous). Chi-Squared Test was used to examine the association between two categories

The data were analyzed with STATA Release 6.0. The results are expressed as relative risk (95% Confidence Interval).



## RESULTS & DISCUSSION

A total of 823 adults, aged 15 - 49 years, residing in South Salam village Khartoum State, Sudan were interviewed for their knowledge, attitude & practice toward HIV/AIDS.

Regarding the demographic characteristics, the survey results during the current year 2016 showed that the distribution study by gender was 54.6% females & 45.4% males, aged between 15---29 years, at a mean age of 26.09 years. 74.97% of the population had sufficient knowledge, while 25.03% of them had not.

The majority of the respondents showed 70.09% Christians & 29.67% Muslims. No significant association (P-Value = 0.085) between sufficient knowledge & religion was shown. Nearly half of the respondents were illiterate (46%), followed by those who complete maximum 5 years elementary education (31.4%) who could just read, then followed by those from secondary school (14.5%). Very few (2.9% & 3.9%) managed to undergo Islamic basic education (khalwa) & intermediate educational level respectively. University graduates were only 1.3%. This reflected a positive linear association between sufficient knowledge and education. 95% confidence interval was found to be 3.404587 to 6.869303. This means that education rate will increase the sufficient knowledge by 4.836025 times those not educated. This results were agreement with studies & reports were done by (Mohammed et al. 2023) which conclude that there a significant association between education level with testing HIV/HIDS. [6]

Nearly half of the respondents (49.5%) had jobs, 28.7% were housewives, 11.1% were students, & 10.7% were jobless. Those who had jobs were 12.64% workers, 10.18% merchants, 9.08% washer, 7.12% builder, 6.75% soldiers, 1.96% tea sellers, 1.35% butchers, & 0.37% teachers. The data showed that 68% of the respondents had additional sources of income beside their jobs. There was no significant association (P-Value = 0.715) between those having other sources of income & their sufficient knowledge.

In regard with the adult behavior in South Salam Village, the distribution of population by marital status showed that more half of them (64.52%) were previously married & were at the range of 15 -19 years, among whom 67.98% were females & 32.02% were males. The peak age of marriage for females was between 15 -19 years, while it was between 20 to 29 years for males. 89.1% were still married, among whom 32.31% were males 67.69% were females. The males who had more than a wife were 26.97% & the females who happened to marry more than once were 31.4%. There was no significant association (P-Value = 0.057) between those who had sufficient knowledge & married persons. This is in agreement with studies & reports were done by (Lawrence et al.,2019).[8]

51.8% of the males had regular sexual partner, while only 21.83% of the females had regular sexual partners. 22.98% of the married persons had regular sexual partners, while 58.22% of the unmarried persons had regular sexual partners. There was a negative association (P-Value = 0.000) between those who had regular partners & sufficient knowledge, as it was reported that, among those who had a sufficient knowledge there was 59.32% of them had not regular sexual partners. This means that sufficient rate will decrease the rate of regular sexual partners. 29.79% of them had between 1 - 4 children each.

The rate of the male homosexual & bisexual activities was 2.94%, while it was 5.13% for the female homosexuals.



61.64% of the respondents confessed that they used to practice sexual intercourse for enjoyment purpose only, while 14.73% used to have it for economical reasons. 22.21% had sex during the last 7 days, 29.04% had sex during the last 4 weeks, 19.12% had sex during the last 12 months and 24.63% had it a long time ago.

Those who had sexual intercourses for the first time were 58.3% at the age range between 15 -19 years, while 32.1% had it before 15 years of age.

The majority (74.51%) of the respondents were not tattooed before, only 25.49% were tattooed before. 30.79% of them used to share tools for tattoo operations. There was no significant association (P-Value = 0.178) between those who had been tattooed and sufficient knowledge was noted.

7.82% of the respondents had blood transfusion operation before. There was no significant association (P-Value = 0.246) between sufficient knowledge & blood transfusion. 75.14% agreed that blood transfusion should not be done without testing the blood.

8.04% of the respondents used to have sedatives. 58.7% of them used sedatives by syringes, of whom 47.37% shared syringes & 10.53% used the same syringe more than once. There was no significant association (P-Value = 0.887) between using sedatives & sufficient knowledge.

56.72% used to drink alcohols daily, 26.54% used to drink alcohols once a week, while 16.73% often used to drink alcohols many time. There was a negative association (P-Value = 0.011) between alcoholic person & sufficient knowledge, as it was reported that among those who had sufficient knowledge, there was 64.18% of them not used to drink alcohol. This means that sufficient rate will decrease the rate of drinking alcohol. This is in agreement with studies & reports were done by (Jingzhen et al. 2020) which conclude that there are a significant association between HIV infections and alcohol consumption among male-to-male sex participants.[3]

In regard with the population knowledge toward HIV/AIDS in South Salam Village, 86.83% heard about AIDS. 43.42% of them said that nutrition will not prevent HIV/AIDS infection. 66.53% said that sticking to one loyal partner would protect them against HIV/AIDS infection. 42.5% said that not using public W.Cs would not protect them from HIV/AIDS infection. 42.1% said that using condoms during sexual intercourse would protect them against HIV/AIDS infection. 52.75% said that contact with persons infected with HIV/AIDS would not affect them, so no need to avoid them. 47.59% believed that eating with persons infected with HIV/AIDS would not affect them. 71.63% said that each person should use a new syringe each time. 34.1% said that bites of mosquitos or similar insects would not transmit HIV/AIDS virus to the individual. 76.86% believed that using the same tools for shaving, blood suction, circumcision by different persons would transmit HIV/AIDS virus to other, 25.21% only knew that kissing would not transfer HIV/AIDS virus to others.

The percentage distribution of the respondents who were tested before for HIV/AIDS revealed that 28.1% of them though that the infected person would not have any symptoms of infection. 16.51% had relatives & friends infected with AIDS. In regard with attitudes & practices towards HIV/AIDS epidemic disaster survey performed in South Salam Village, it had been revealed that 43.3% of them had a positive HIV test result. 2.03% said that they could most probably be infected with HIV/AIDS, the majority (61.15%) never through so, 11.88% said it was less probable.

To avoid being infected with HIV/AIDS, 54.27% of the respondents changed their sexual behavior, 53.49% started changing their sexual behavior during the last 12 months

Table (1): Test Results of Goodness of Fit the Estimated Binary Logistic Regression Model of Care for Infected Persons on Sufficient Knowledge:

LR chi2 (1)	26.04
Prob>chi2	0.0000
Pseudo R2	0.0271
Log Likelihood	- 467.59132
Odds Ratio	2.668852
95% Conf. Interval	1.828071    3.896333
Estimate (Log Odds)	0.9816486

57.14% said that they were ready & willing to care for the infected persons. There was a positive linear association between caring of the infected persons and sufficient knowledge. As shown in table (1), LR chi2 (1) equals 26.04 with Prob(0.000), is statistically significant Model with Log Likelihood (-467.59132). The coefficient of Sufficient Knowledge is 0.9816486, so an increase of one unit in Sufficient Knowledge increases the caring of infected persons by  $\exp(0.9816486) = 2.668852$  on the Odds Ratio Scale. 95% confidence interval was found to be 1.828071 to 3.96333, and it does not include one, so the Sufficient Knowledge is a significant indicator of the Caring of Infected Persons. 64.47% of the respondents said that HIV positive people should disclose that they are infected with this devastating disease. The Binary Logistic Regression Model Represent as fallow:

$$\text{Care for infected persons} = -0.2198585 + (0.9816486) \text{ Sufficient Knowledge}$$

Table (2): Test Results of Goodness of Fit the Estimated Binary Logistic Regression Model of Sexual Behavior Change on Sufficient knowledge:

LR chi2 (1)	5.07
Prob>chi2	0.0243
Pseudo R2	0.0121
Log Likelihood	- 206.36954
Odds Ratio	2.19431
95% Conf. Interval	1.091931    4.409617
Estimate (Log Odds)	0.7858676

As shown in table (2), LR chi2 (1) equals 5.07 with Prob(0.0243), is statistically significant Model with Log Likelihood (-206.36954). The coefficient of Sufficient Knowledge is 0.7858676, so an increase of one unit in Sufficient Knowledge increases the Sexual Behavior Change by  $\exp(0.7858676) = 2.19431$  on the Odds Ratio Scale. 95% confidence interval

was found to be 1.091931 to 4.409617, and it does not include one, so the Sufficient Knowledge is a significant indicator of the Sexual Behavior Change. The Binary Logistic Regression Model Represent as fallow:

$$\text{Sexual behavior change} = -0.5798185 + (0.7858676) \text{ Sufficient Knowledge}$$

Table (3): Test Results of Goodness of Fit the Estimated Binary Logistic Regression Model of Sufficient knowledge on Education:

LR chi2 (1)	87.00
Prob>chi2	0.0000
Pseudo R2	0.0939
Log Likelihood	- 419.57647
Odds Ratio	4.836025
95% Conf. Interval	3.404587    6.869303
Estimate (Log Odds)	1.576093

As shown in table (3), LR chi2 (1) equals 87.00 with Prob(0.0000), is statistically significant Model with Log Likelihood (-419.57647). The coefficient of Education is 1.576093, so an increase of one unit in Education increases the Sufficient Knowledge by  $\exp(1.576093) = 4.836025$  on the Odds Ratio Scale. 95% confidence interval was found to be 3.404587 to 6.869303, and it does not include one, so the Education is a significant indicator of the Sufficient Knowledge. The Binary Logistic Regression Model Represent as fallow:

$$\text{Sufficient Knowledge} = 0.4010695 + (1.576093) \text{ Education}$$

45.9% of the respondents heard about the condom. This reflected a positive association (P-Value = 0.0000) between sufficient knowledge and knowing the condom, as it was reported that among those who had sufficient knowledge there was 57.24% of them heard about the condom. This means that sufficient rate will increase the rate of knowing condom. 71% of them said that they saw it before, but 20.53% only used it. Among those 37.76% used it to prevent HIV/AIDS infection and other diseases, 41.84% used it to prevent pregnancy, 20.4% used it as per wish of their partners. 20.44% of them knew where and from whom they could get condoms. This is in agreement with studies & reports were done by (Mohammed et al. 2023) which conclude that there a significant association between education level with testing HIV/HIDS[6]



## CONCLUSION

The gender distribution was nearly equal, & the majority of South Salam village adult were Christians from Southern Sudan with a high illiteracy rate & low socio-economic status, & more than half of them were married & had children.

The population knowledge about HIV/AIDS as a disease was high among them, although attitude & sexual behavioral change did not accompany it.

2.94% of the males were homosexual & bisexual, while 5.13% of the females were homosexual.

Knowledge about condom & their usage was very low among South Salam resident.

It is now significantly evident that sufficient knowledge will increase the rate of sexual behavioral changers & those willing to care for infected persons, as represented by the following equations:

Sexual behavior change =  $-0.5798185 + (0.7858676)$  Sufficient Knowledge

Care for infected persons =  $-0.2198585 + (0.9816486)$  Sufficient Knowledge

Hence, it is concluded that education rate will increase that sufficient knowledge, as represented by the following equation:

Sufficient Knowledge =  $0.4010695 + (1.576093)$  Education

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