
By

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### ABBREVIATIONS

<table>
<thead>
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<tr>
<td>AIDS</td>
<td>Acquired Immuno Deficiency Syndrome</td>
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<td>ARC</td>
<td>AIDS Related Complex</td>
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<tr>
<td>CSF</td>
<td>Cerbro-spinal Fluids</td>
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<td>ELISA</td>
<td>Enzyme-Linked Immunosorbent Assay</td>
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<td>FGDs</td>
<td>Focus Group Discussions</td>
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<td>HIV</td>
<td>Human Immuno Deficiency virus</td>
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<td>IEC</td>
<td>Information, Education and Communication</td>
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<td>KAPs</td>
<td>Knowledge, Attitude and Practices</td>
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<td>MTCT</td>
<td>Mother to Child Transmission</td>
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<td>NGOs</td>
<td>Non-Governmental Organizations</td>
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<td>PCR</td>
<td>Polymerase Chain Reaction</td>
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<tr>
<td>PLWHA1s</td>
<td>People Living with HIV/AIDS</td>
</tr>
<tr>
<td>SNAP</td>
<td>Sudan National AIDS Control Programme</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
</tr>
<tr>
<td>STDs</td>
<td>Sexually Transmitted Diseases</td>
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<tr>
<td>STIs</td>
<td>Sexually Transmitted Infections</td>
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<td>UNAIDS</td>
<td>United Nations Programme on HIV/AIDS</td>
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<tr>
<td>Acronym</td>
<td>Full Name</td>
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<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
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<td>UNICEF</td>
<td>United Nation International Children Emergency Funds</td>
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<td>UNDP</td>
<td>United Nation Development Programme</td>
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<td>WHO</td>
<td>World Health Organization</td>
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ABSTRACT

**Background:** Health education is an important measure in the control of HIV infection especially when considering that AIDS disease has no vaccine, treatment or cure for the time being. The first AIDS case diagnosed in the Sudan was in 1986, since then the prevalence of disease is increasing, reaching (1.6%) by 2008. Realizing these facts, it is important to explore the knowledge, attitudes and practices regarding HIV/AIDS in the Sudan. According to SNAP report, the younger and middle age groups in the Sudan were the mostly affected with HIV/AIDS, (88.5%) of reported AIDS cases being among 15-49 years old. Schools are considered to be a very important setting for health education, and the AIDS education programme in schools is an efficient strategy to prevent HIV infection and stimulating students' interest to improve their own health and transfer AIDS education to their families and community. A prospective interventional study (pre and post) was conducted in Khartoum Locality, Khartoum State to study the role of School Health Education in the promotion of the knowledge, attitudes and practices among the secondary schools students towards HIV infection.

**Materials and methods:** The target population is composed of 6 schools included in the study, and another 6 schools as control. The sample size was determined by using the proportion formula to obtain a total sample of 844 students. The intervention started at the beginning of the academic year 2007/2008. The program included workshops for the teacher committees. A training manual was given to the teachers and students in the intervention schools, Data were collected using a pre-and post-KAP survey. Data were analyzed by computer using Chi-square test.

**Results:** There was a statistically significant change (P. value = 0.000) in the students’ knowledge about the modes of transmission of AIDS, (41.2%) of
the students knew about the modes of transmission of AIDS before the intervention, increasing to (100%) after the intervention (P. value = 0.000). There were no significant changes in the comparison schools from (31.0%) to (27.0%). 41.9% of the students mentioned all the methods of protection from HIV infection before the intervention. This increased to (91.5%) of the students after the intervention. The changes were significant (P. value = 0.000), where there were no significant changes in the comparison schools from (40.3%) to (40.5%). 13.2% of the students agreed with not isolating people living with HIV from their families and community before the intervention. This increased to 79.6% after the intervention (P. value = 0.000). There was no significant change in the comparison schools from (12.3%) to (13.0%). 28.2% of the students discussed the topic of AIDS frankly with their friends before the intervention. This increased to 79.4% after the intervention (P. value = 0.000). There was no significant change in the comparison schools from (18.0%) to (14.5%). Half of the students (50.9%) agreed to do HIV test before the intervention and 88.9% after the intervention (P. value = 0.000). There was no significant change in the comparison schools from (42.9%) to (41.7%).

**Conclusion:** Health education induces a significant change on KAPs among the students towards HIV infection in the study schools. At the same time, there are no significant changes among the comparison groups, which reflect the effectiveness of school health education program implemented.
المستخلص

خلفية: يعتبر التثقيف الصحي عاملًا مهمًا في مكافحة مرض متلازمة العوز المناعي المكتسب (الإيدز) خاصة إذا وضمنا في الاعتبار أنه لا يوجد تطعيم أو علاج للمرض حتى الآن. تم تشخيص أول حالة مرضية في السودان في العام 1986م، حيث تشير التقديرات بأن معدل انتشار مرض الإيدز في السودان (1.6%)، مما دعى إلى الحاجة لتعليم ومعرفة الأشخاص ووسائل التوثيق. تأتي من بين 15-49 سنة أقصى الفئات عرضة للإصابة بفيروس العوز المناعي البشري، حيث بلغت نسبة من جملة المصابين بالإيدز في السودان (88.5%). تعد المدارس من أهم ميادين التثقيف الصحي، وتعتبر برامج التثقيف الصحي للوقاية من مرض الإيدز في المدارس من أكثر الاستراتيجيات الوقائية من التربية بالمدرسة، حيث وضع هذه الدراسة التدريبي للتعليم ونشر الأدبيات الصحية بالإيدز وسط أسرهم ومجتمعاتهم. أجريت هذه الدراسة التدريبي في المدارس الثانوية في مدينة الخرطوم، ولاية الخرطوم بهدف دراسة دور التثقيف الصحي المدرسي في تعزيز المعرفة والموافق والسلاطات وسط الطلاب تجاه الإصابة بفيروس الإيدز.

منهجية الدراسة: تكون الفئة المستهدفة من 6 مدارس ثانوية كمجتمع دراسية و6 مدارس ثانوية أخرى كمجموعة ضابطة. تم تحديد الفئة باستخدام معايير النسبة والثانوية. للحصول على جملة عينة 844 طالبًا وطالبة من مدارس التدخل والمقارة. بدأ البرنامج التثقيفي الدخلي في المدارس في العام الدراسي 2007/2008م، وقد احتوى البرنامج على ورشة عمل للأستاذة، وتوزيع الدليل المستخدم في الدراسة على الأستاذة والطلاب في مجموعة الدراسة. تم عمل مسح قبلي وعدي عن معرفة والموافق والسلاطات في الدراسة الثانوية التي طبق فيها البرنامج وكذلك المدارس الضابطة تجاه مرض الإيدز باستخدام استبانه معدة إعداد دقيقًا ومختبرة قبل الاستخدام. تم تحليل المعلومات باستخدام اختبار كا².

النتائج: من أهم نتائج الدراسة: هناك قيمة تغييرات دالة إحصائياً (P. value = 0.000) على معرفة الطلاب بطرق انتقال مرض الإيدز، حيث يعرف (41.2%) من الطلاب طرق انتقال مرض الإيدز قبل التدخل وازداد ذلك ليشمل كل الطلاب (100%) بعد التدخل، بينما لم يسجل أي تغيير ذي دالة إحصائية في مدارس المقارنة من (31.0%) في المحسوس القبلي وقلت هذه النسبة لتصبح (27.0%) في المحسوس النهائي. (41.9%) من الطلاب ذكروا كل طرق الوقاية من الإصابة بفيروس الإيدز قبل
التدخل، ازدادت هذه النسبة لتصبح (91.5%) بعد التدخل وهو تغير ذو دالة إحصائية (P. value = 0.000) يعكس تغيير ذو قيمتة إحصائية (P). من الطلاب الحاملين لفيروس الإيدز عن أسرهم ومجتمعهم قبل التدخل، ازدادت هذه النسبة لتشمل (79.6%) من الطلاب بعد التدخل وهو تغير ذو دالة إحصائية (P. value = 0.000). بينما لا يوجد تغيير ذو دالة إحصائية (P. value = 0.000) من الطلاب إيجابية حيث لا يوافقون على عزل الأشخاص المصابين بفيروس الإيدز بمساحة (40.5%) من الطلاب (P). هذه النسبة تشمل غالبية الطلاب (79.4%) بعد التدخل وهو تغير ذو دالة إحصائية (P), بينما لا يوجد تغيير ذو دالة إحصائية في مدارس المقارنة من (18.0%) إلى (14.5%). نصف الطلاب (50.9%) يوافقون على إجراء الفحص الطبي للفيروس الإيدز قبل التدخل، وازدادت هذه النسبة لتصل (88.9%) بعد التدخل مما يعكس تغييراً ذا دالة إحصائية (P). بينما لا يوجد تغيير ذو قيمة إحصائية في مدارس المقارنة من (42.9%) إلى (41.7%).

الخاتمة: من نتائج الدراسة يمكن استخلاص أن البرنامج التثقيفي الذي طبق أحدث تغييرات ذات دلالات إحصائية في معرفة ومهارات الطلاب فيما يخص الإصابة بفيروس الإيدز في مدارس التدخل، في نفس الوقت ليست هناك تغييرات دالة إحصائيًا في مدارس المقارنة الأمر الذي يعكس فعالية التثقيف الصحي المدرسي الذي طبق في مدارس التدخل.
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بسم الله الرحمن الرحيم

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قال رسول الله (ص) :

"يا معشر الشباب من أستطاع منكم البياء فليتزوج فإنه أغض للبصر وأحصن للفرج، ومن لم يستطيع فعليه بالصوم فإنه له واجب.")
Dedication

To my mother and father.

To my wife

and

to my son “Ahmed”

with much love.
Appendix (1): Arabic Questionnaire

若您愿意，您可以完成以下问卷，以便了解您对艾滋病的了解和态度。问卷内容涉及您对艾滋病的了解、对艾滋病患者的态度以及对艾滋病患者支持的意愿。

一、基本信息
1、您是男性还是女性？
2、您是单身还是已婚？
3、您目前的健康状况如何？
4、您对艾滋病的了解程度如何？
5、您对艾滋病患者的看法如何？
6、您愿意为艾滋病患者提供支持吗？

二、艾滋病的了解
1、您是否知道艾滋病是一种什么样的疾病？
2、您是否了解艾滋病的传播途径？
3、您是否知道如何预防艾滋病？

三、艾滋病患者的了解
1、您是否知道艾滋病患者需要什么支持？
2、您是否愿意为艾滋病患者提供支持？
3、您是否愿意为艾滋病患者提供帮助？

四、艾滋病的预防
1、您是否愿意接种艾滋病疫苗？
2、您是否愿意参与艾滋病的宣传活动？

如果您有任何疑问或需要帮助，请随时联系我们的工作人员。
لا يمكنني قراءة النص العربي بشكل طبيعي. الرجاء تحويل النص إلى نسخة قراءة عادية.
لا يوجد نص يمكن قراءته بشكل طبيعي من الصورة المقدمة.
لا أعرف، لا أستطيع أن أسمع، لا أناشد، هل بإضطراب الأداء الإدواري؟

لا جواب، سيئة.

لا يمكن أن أشعر بالإصابة إلا إذا كنت صديقًا، هل يمكن أن أشعر بالإصابة مع الراحة؟
Appendix (2): English Questionnaire

University of Khartoum
Faculty of Public and Environmental Health
Department of Health Education

A questionnaire on KAPs Regarding AIDS among Secondary School Students in Khartoum Locality

Date: ........................................ – Name of school: ........................................

– Name of class room ........................................

– Student’s Name: ........................................

Serial No. ........................................

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1- Section one: Demographic data.

2- Section two: Knowledge about AIDS.

3- Section three: Attitudes and Practices towards AIDS.

Section one: Demographic data:

1- Sex: 1. Male □ 2. Female □

2- Age (in years): 1. 12 – 13 □ 2. 14 – 15 □ 3. 16 – 17 □ 4. >17 □


   (A) Marital status: 1. Married □ 2. Single □

4- Religion: 1. Muslim □ 2. Christian □

5- Father’s education level:

   1. Illiterate □ 2. Khalwa □ 3. Primary school □

6- **Mother’s education level:**
   1. Illiterate  □  2. Khalwa  □  3. Primary school  □

7- **Father’s occupation:** 1. Governmental  □  2. Private  □

8- **Family income per month (SDG):**
   1. 50 - 300  □  2. 301 - 500  □  3. ≥500  □

**Section two: Knowledge about AIDS:**

9- **What are the most important and dangerous diseases facing the world today?**
   1. Mentioned AIDS □  2. Did not mentioned AIDS □
   3. Don’t know □

10- **What are the most important and dangerous diseases facing Sudan today?**
    1. Mentioned AIDS □  2. Did not mentioned AIDS □
    3. Don’t know □

11- **The causative organism of AIDS is a virus?**
    1. Yes  □  2. No  □  3. Don’t know □

12- **What are the symptoms of AIDS?**
    1. Know □  2. Don’t know □

13- **Would you think that a person can have an AIDS organism without having any signs and symptoms?**
    1. Yes □  2. No □  3. Don’t know □

14- **Do you know or hear about any person infected with AIDS?**
    1. Yes □  2. No □  3. Don’t know □

15- **Do you know how AIDS can be transmitted?**
    1. Yes □  2. No □

16- **Do you believe that HIV carrier can transmit the disease?**
    1. Yes □  2. No □  3. Don’t know □

17- **Do you know that a person can transmit HIV via shaking hands?**
    1. Yes □  2. No □  3. Don’t know □
18- Is it possible that eating or drinking by utensils used by infected person can transmit HIV?
   1. Yes □ 2. No □ 3. Don’t know □

19- Is it possible that injection by needles or syringes used by HIV carrier can transmit HIV?
   1. Yes □ 2. No □ 3. Don’t know □

20- Is it possible that deep prolonged kissing with HIV carrier can transmit HIV?
   1. Yes □ 2. No □ 3. Don’t know □

21- Is it possible that involving in unprotected sex with prostitutes can transmit HIV?
   1. Yes □ 2. No □ 3. Don’t know □

22- Is it possible that involving in unprotected sex with multi-partners can transmit HIV?
   1. Yes □ 2. No □ 3. Don’t know □

23- Is it possible that mosquito bites can transmit HIV?
   1. Yes □ 2. No □ 3. Don’t know □

24- Blood transfusion from infected or those HIV carriers can transmit HIV?
   1. Yes □ 2. No □ 3. Don’t know □

25- Is it possible that involving in unprotected sex with homosexual can transmit HIV?
   1. Yes □ 2. No □ 3. Don’t know □

26- Infected pregnant woman can transmit HIV to her infant?
   1. Yes □ 2. No □ 3. Don’t know □

27- AIDS causation organism has a long incubation period (10 years)?
   1. Yes □ 2. No □ 3. Don’t know □

28- Persons with STDs are more susceptible to HIV transmission during sexual intercourse?
1. Yes  2. No  3. Don’t know

29- AIDS patient can restore his immuno-system?
1. Yes  2. No  3. Don’t know

30- AIDS can be cured?
1. Yes  2. No  3. Don’t know

31- People at risk of acquiring HIV are:
1. Those having STDs
2. Infants borne to mothers who have HIV infection
3. People who have multi-sexual practices
4. Intravenous drug users
5. The answer 1, 3
6. All answers are correct

32- For protection against HIV infection:
1. Stick to one partner
2. Using condom
3. Abstain from illegal sexual practices
4. Sterilization of surgical equipment
5. All answers are correct

33- The method effective in preventing from HIV infections:
1. Antibiotics
2. Immuno-drugs
3. Traditional treatment
4. Change personal risk behaviour
5. Others (specify) ………………………………………………………………………………………………...

Section three: Attitudes and practices towards AIDS:

34- People with HIV should be isolated from their families?
1. Agree  2. Disagree  3. Don’t know

35- HIV carrier should be permitted to work in restaurants?
1. Agree  2. Disagree  3. Don’t know

36- Agreement or disagreement with the idea of preventing HIV infection through the prevention of using contaminated needles
among drug abusers?
1. Agree  2. Disagree  3. Don’t know

37 Are you agree with wearing the AIDS infected person or HIV carrier clothes?
1. Agree  2. Disagree  3. Don’t know

38- Have you ever discussed the topic of AIDS with your colleagues or neighbours?
1. No  2. One or two  3. Many  4. Don’t know

39- Prevention of HIV infection is possible by changing personal risk behaviours?
1. Agree  2. Disagree  3. Don’t know

40- What is the effective method of preventing HIV infection?
1. Know  2. Don’t know

41- Did your friends change their behaviours or life-styles after hearing and learning about AIDS?
1. Yes  2. No  3. Don’t know

42- Are you willing to change your behaviour or life-style after hearing and learning about AIDS?
1. Yes  2. No  3. Don’t know

43- Have you changed your behaviour or life-style after hearing and learning about AIDS?
1. Yes  2. No  3. Don’t know

44- What are behaviours changes you made after hearing and learning about AIDS?
1. Positive  2. Negative

45- Would you terminate the friendship after knowing that your friend is an HIV carrier?
1. Yes  2. No  3. Don’t know

46- Have you ever discussed the topic of AIDS frankly with your friends?
1. Yes  2. No

47- Do you discuss the topic of AIDS frankly with your family?
1. Yes  2. No

48- Do you agree with doing an HIV test?
49- Do you have a role to play in controlling AIDS?
1. Yes  □  2. No  □  3. Don’t know  □

50- Do you believe that religion plays a role in the protection against HIV infection?
1. Yes  □  2. No  □

Appendix (3): Map of the study area
1.1. INTRODUCTION

AIDS is a major public health problem in the world. Since the AIDS epidemic was first identified in 1981, it has spread throughout the world (WHO, 2000).

AIDS is a multidisciplinary, multisectoral and multidimensional disease, involving a complex range of economic, social, cultural, educational and behavioural as well as epidemiological factors (WHO, 2006).

AIDS leads to frustrations and despair and kills young and middle-aged adults, who are the mainstay of the family, the backbone of the work force and the key to development (WHO, 2006).

AIDS causes social, psychosocial and economical problems. The AIDS patient and his society suffer. Its impact is spreading over social establishments such as families, schools, universities courts, army and government. AIDS victims lose their jobs, families and friends. Moreover, children suffering from AIDS may not be accepted in public schools (Alwia, 1996).

Organized efforts and comprehensive strategies with regard to health education, should be implemented to limit the spread of the disease. Teenagers need to be targeted for health education programmes. This is due to the fact that most negative or positive behavioural patterns are consolidated during adolescence (Nakajima, 1992).
Avoiding high-risk behaviours is the main strategy for prevention. Young people in schools can be educated about AIDS prevention using various interventions, including the involvement of peers, lectures, posters, focus group discussion, etc. Given a chance, young people can contribute a lot to combat the epidemic; they are a force for change (WHO, 2006).

School is considered to be a very important setting for health education among children and adolescents, and school health programs are one of the most efficient strategies used to prevent major health and social problems. Schools are the major institution for providing the instruction and experiences that prepare young people for their roles as healthy and productive adults (WHO, 2003).

School provides an excellent opportunity for helping children to acquire healthy knowledge, skills and values. Effective health education programme make an important difference, not only in knowledge, but also in attitudes and behaviors that result in healthy life style and future prospects (Nakajima, 1992).

AIDS education programmes in schools involving close communication with teachers, classmates, health educators and parents would tend to reduce risky sex among students who are perceptive of their own risk, involving people who are living with HIV/AIDS which would be helpful for students to more deeply understand people who are living with HIV/AIDS (Carballo, et al., 1996; Sapa, 1996).
1.2. JUSTIFICATION:

1- AIDS is a serious disease that has no vaccine, treatment or cure for the time being. So the only means to prevent the occurrence of HIV infection by raising awareness about the disease via health education (WHO, 2006).

2- Young people, the target group, are a big majority who are infected with HIV/AIDS. (2.1) million children under 15 years become infected by 2008 (UNAIDS, WHO, 2009).

3- The younger and middle age groups in Sudan were the mostly affected with HIV infection (88.5%) (SNAP, 2009).

4- Secondary school students (adolescents) are exposed today to new risks to health and longevity: they are looking for adventure, mainly emotional, or usage of drugs. They may be infected by HIV incidentally without knowing the modes of transmission or control measures (WHO, UNESCO, UNICEF, 1992).

5- HIV/AIDS is becoming one of the major health concerns in Sudan. The prevalence rate in Sudan is (1.6%) which proves the disease is increasing, the thing that dictates urgent interventions to stop its progress. Such interventions should be based on facts reflecting the level of knowledge, attitudes and practices related to HIV/AIDS (SNAP, 2009).

6- The factors behind the spread of the HIV/AIDS epidemic in Sudan were
identified as war and the resulting population movement (displacement, refugees, military personnel); the wide open borders with nine African countries; the economic crisis in the country and urbanization and lack of awareness (SNAP, 2006).

7- Students are receptive to learning, so they contribute a lot to combat the AIDS. They are a force for change, and well distributed in the community, so if they are well informed and educated in their schools about AIDS transmission and control. Health education can provide benefits to all levels of society. Students can transfer AIDS education to their parents, families, friends, communities and the whole nation (WHO, UNESCO, UNICEF, 1992).

8- According to the secondary schools syllabus in Sudan there is little information about AIDS education (Ministry of Education, 2009).

9- The WHO Expert Committee Rationale for investment in school health programmes reveals that “school health programmes can be the most efficient and cost-effective way to improve students health and as a result their academic performance”. (WHO, 1997).
1.3. THE OBJECTIVES OF THE STUDY:

1.3.1. The General Objective:

To study the role of school health education in the promotion of the knowledge, attitudes, and practices among the students towards HIV infection in Khartoum Locality.

1.3.2. The Specific Objectives:

1.3.2.1. To assess the role of school health education in promoting the students’ knowledge towards HIV infection.

1.3.2.2. To assess the role of school health education in promoting the students’ attitudes towards HIV infection.

1.3.2.3. To assess the role of school health education in promoting the students’ practices towards HIV infection.
1.4. LITERATURE REVIEW

Health education is an essential tool of community health. Every branch of community health has a health educational aspect. In the end, community health is just health education and every community health worker is a health educator. Health education is concerned with promoting health as well as reducing behaviour induced disease (Park, 1995).

1.4.1. Definition of Health Education:

Health education is the translation of what is known about health, into desirable individual and community behaviour patterns by means of an educational process (WHO, 1999).

Health education is any combination of learning opportunities and teaching activities designed to facilitate voluntary adaptation of behaviors that are conducive to health (Green, et al., 1980).

Health education is a translation of scientific knowledge into constructive action by the community; the objective is to teach people how to improve their own health condition (WHO, 1988).

Health education is the part of health care that is concerned with promoting healthy behaviour (WHO, 1988).

The definition adopted by the National Conference on Preventive Medicine in USA Health education is “a process that informs motivates and helps people to adopt and maintain healthy practices and life styles,
advocates environmental changes as needed to facilitate this goal and conduct professional training and research to the same end” (Park, 2007).

1.4.2. Objectives of Health Education:

The main objectives of health education are to inform people and to disseminate scientific knowledge about health promotion. In addition, it is to motivate people to change their habits and ways of living, and guiding them into action. Health education involves people in all phases for solving their own problems, finding out about their problems, and in planning, implementing, and evaluating programmes to solve them. The process works best when the people are truly interested in the problem at hand (Park, 2002).

The Alma Ata Declaration adopted in 1978 provides a useful basis for formulating the aims and objectives of health education which may be stated as follows:

1) To encourage people to adopt and sustain health-promoting lifestyle and practices.
2) To promote the proper use of health services available to them.
3) To arouse interest, provide new knowledge, improve skills and change attitudes in making rational decisions to solve their own problems.
4) To stimulate individuals and community self-reliance and participation for achieving health development through individual
and community involvement at every step from identifying problems to solving them (Park, 2007).

The educational objectives are aimed at the group to be taught in the educational programme, the knowledge to be acquired, behaviour to be acquired or action to be mastered. They must be pertinent if the programme is to be appropriate and successful (Park, 2007).

The educational approach is a major mean today for achieving change in health practices and the recognition of health needs. It involves motivation, communication and decision-making. The results, also slow, are permanent and enduring (Park, 2007).

The focus of health education is on people and on action; its goal is to make realistic improvements in the basic quality of life. Many health education programmes hope to influence behaviour or attitudes. The implication of these new concepts is that health education is an integral part of the national health goals. The fact remains that effective health education has the potential for saving many more lives than has any one research discovery in the foreseeable future (Park, 2007).

Social scientists explain the process of change within individuals. People appear to pass through a series of distinguishable stages before they adopt new practices. These stages are as follows:
1- Awareness: At this stage, the person comes to know about the new idea or practice. He has only some very general information about it and knows little about its usefulness.

2- Interest: This is the stage when the person seeks more detailed information. He is willing to listen or read or learn more about it.

3- Evaluation: During this stage, the person weighs the pros and cons of the practice and evaluates its usefulness to him or his family, such an evaluation is mental exercise and results in a decision to try the practice or reject it.

4- Trial: This is the stage when the decision is put into practice. He would need additional information and help at this stage so as to overcome the problems in implementing the idea.

5- Adoption: At this stage the person decides that the new practice is good and adopts it (Park, 1995).

1.4.3. School Health Education:

Elementary and secondary schools are in good position to promote healthful life style among young people who are in the process of forming opinions, attitudes and values (WHO, UNESCO, UNICEF, 1992).

School health programmes are based on four premises:

i) Schools have an obligation to help pupils and personnel to maintain a high level of health.
ii) Schools can provide learning experiences that encourage young people to appreciate the importance of health.

iii) The school health programme provides information with which students can feel confident of their ability to make intelligent decisions regarding personal, family and community health.

iv) By providing a comprehensive health education programme the school demonstrates, in tangible ways, its commitments to improving the quality of life for the residents of the community (WHO, UNESCO, UNICEF, 1992).

A healthy and educated child population means a healthy and prosperous future; there are about 1000 million children and young people of school age in the world today. Out of this number, hundreds of millions are actually attending school. They constitute the greatest single readily reachable population. Schools provide an excellent opportunity for helping children to acquire health knowledge, skills and values and thus for shaping a healthy future. Effective health education programmes make an important difference, not only in knowledge, but also in the attitudes and behaviours that result in healthy life-style and future prospects (Nakajima, 1992; Carballo, et al., 1996; Sapa, 1996).

Health education in schools is a function of the school teacher. The health officer and public health worker assistants may furnish teaching materials and advice, but the teacher is the key person in the presentation of
the material to the children. To do this important work, the teacher should be well-versed in health education techniques (Park, 2007).

Children take back to their parents the health instructions they receive in schools, and even more important, when they become adults they apply this knowledge to their own families (Park, 2007).

Schools should play a significant role in preventing HIV infection and abstaining from illegal sexual intercourse (Jones, Bunde-Binusite, 1993).

One of the most effective means for improving the health of nations is school health education. The organizers of the Fourteenth World Conference on Health Education, in Helsinki, fully understood the need to help the world’s schools to implement effective health education. In many countries it is increasingly recognized that a clearly defined and strongly implemented policy and strategy for health education needs to be developed at the national level in order to provide a framework and commitment for the successful practice of health education within schools (Kolbe, et al., 1992).

The health and wellbeing of children and youth must be a fundamental value for all countries. Recently, in addition to longstanding health problems urgent worldwide health and social problems including HIV/AIDS have underscored the need for collaboration among young people, families, schools, agencies, communities and governments in

The experience of the past four decades has demonstrated that comprehensive school health education can have a profound influence on students’ health knowledge, attitudes, and behaviours. Often in collaboration with WHO and other international organizations, many countries have carried out carefully designed programmes, though few have been evaluated. Although little outcome data exists concerning changes in health behaviour in youth as a result of school health education programmes, recently there is some new and important evidence of changes in students’ health knowledge, attitudes and reported behaviour (WHO, UNESCO, UNICEF, 1992).

It is common to emphasize the economic benefits of school health programme in HIV/AIDS. No doubt this is important; however, there is a need also to recognize the moral basis for ensuring education and health for all. Also leaders in health and education, while seeking to capitalize on the new infusion of political will, must not abandon their obligation to promote an educational system which focuses on all students. That is a system which not only prepares children for employment but also helps them to be fully-functioning individuals in society (Nakajima, 1992).

The AIDS education programme was able to improve knowledge and attitudes considerably; it should, therefore, be extended to more schools to
multiply its effect, based on that a large number of adolescents and youth attend school or are in contact with those who do (WHO, UNESCO, 1992).

1.4.4. History and definition of AIDS:

AIDS stands for acquired immunodeficiency syndrome, a pattern of devastating infection caused by the human immunodeficiency virus (HIV), which attacks and destroys certain white blood cells that are essential to the body’s immune system (UNAIDS, 2006).

AIDS is a disease affecting human beings. It was first recognized in the USA in 1981, and at the same time began to be recognized in Central Africa. It has spread at an alarming rate throughout these regions and the rest of the world (Mann, et al., 1992).

AIDS is considered to be an international problem; it is the disease that both developed and developing countries suffer from (Alamri, 1988).

AIDS is defined as a disease indicative of defect in cell-mediated immunity occurring in a person with known cause of immunodeficiency other than the presence of HIV. WHO defined AIDS in adults where diagnostic resources are limited by the existence of two of the major signs associated with at least one minor sign in the absence of known causes of immune-suppression such as cancer or severe malnutrition or other recognized etiology (Mann, et al., 1992).
1.4.5. History of the problem:

AIDS was first recognized in the United States in 1981; earlier cases were found by retrospective analysis to have occurred in 1978 in the USA and in the late 1970 in Equatorial Africa (Park, 1995).

By early 1989 more than 140,000 AIDS cases had been reported officially to WHO. In 1988 WHO estimated that at least five million people in the world are infected with the disease (WHO, 1989).

AIDS has rapidly established itself throughout the world, and is likely to endure and persist well into the 21st century. AIDS has evolved from a mysterious illness to a global pandemic which has infected tens of millions in less than 20 years (Park, 2007).

Promising development has been seen in recent years in global efforts to address the AIDS epidemic, including increased access to effective treatment and prevention programmes. However, the number of people living with HIV continues to grow, as does the number of deaths due to AIDS (Park, 2009).

Reported cases from 192 countries received by WHO indicate that there are more than one million cases in the world since the recognition of AIDS and up to 1994. The report reflects the number of cases reported, but it does not reflect the real number of infected people, because some countries are reported regularly, other are periodically, while few countries do not report (WHO, 2000).
(33.4) million persons had already been infected with HIV by the end of 2008, of whom (31.3) million were adults, (15.7) million were women, (2.1) million were children under 15 years and (2.0) million had already died (UNAIDS, WHO, 2009).

AIDS deaths in 2009 were (2.0) million, of whom (1.7) million were adults and 280000 were children under 15 years (UNAIDS, WHO, 2009).

People newly infected with HIV in 2008 were (2.7) million of whom (2.3) million were adults and 430000 were children under 15 years (UNAIDS, WHO, 2009).

The first confirmed cases in sub-Saharan Africa were diagnosed in Europe in 1983. Among those initial patients were persons who had come to Europe for medical care and who had almost certainly been exposed to HIV in Africa (Mann, et al., 1992).

Infections with HIV are now endemic in several African countries, estimates of the number of infected people range in millions. In one major hospital in Central Africa, up to 35% of the children and adults admitted had HIV infection (Mann, et al., 1992).

Sub-Saharan Africa countries are to bear the brunt of the global epidemic, (63%) of all adults and children with HIV globally live in this region and almost (72%) of all adult and child deaths due to AIDS in 2006 occurred in this region. Overall Sub-Saharan Africa is home to an estimated (22.4%) million adults and children infected with HIV by the end

The total number of HIV/AIDS cases reported since 1986 was 11,757 cases, of which 5,266 were AIDS cases, while 6,491 were asymptomatic HIV infection. According to SNAP report 2006, the younger and middle-age groups were the mostly affected (88.5%) of reported HIV/AIDS cases, being among 15-49 years old (SNAP, 2006).

The male to female ratio is a bit 2 : 1 with 3511 males versus 1,755 females being reported as AIDS cases (SNAP, 2006).

The major mode of HIV transmission among reported AIDS cases was heterosexual transmission which accounted for 4802 (97%) of all reported AIDS cases. The prevalence rate among the general population of Sudan was estimated to be (1.6%) (SNAP, 2006).

1.4.6. Causative agent:

The causative agent is a recognized retrovirus. It has been given different names but is now internationally known as HIV. The most common type is HIV-1 (WHO, 1995). Retroviruses were known long before the emergence of AIDS and HIV-1. Many are RNA-containing tumor viruses which cause sarcomas or leukaemias in a variety of animals and mammary-sinoussi. Montagnier and colleagues at the Pasteur Institute in 1983, they called their isolate lymphadenopathy-associated virus (LAV). Soon there after in 1984 Robert Gallo and co-workers in the U.S.A, described the same virus but called it Human T-lymphotropic virus- III
(HTLV-III). In 1985 another retrovirus of the HIV family was isolated from persons living in West Africa; this virus was called LAV-2 by the French, which found in the patients with AIDS or AIDS-related complex (ARC). The same virus was isolated also in Europe and America and appeared to be more closely related to simian T-lymphotropic virus-III than to HIV-I. Among isolates of HIV-II some seem to cause AIDS, while others may not (Hira, et al., 1989). HIV-II is particularly the same as HIV-I in reaction to epidemiological picture but HIV-II is less pathogenic or may just take longer to cause immunodeficiency. The observed difference is probably due to the difference in viral load between individuals infected with HIV-2 and those infected with HIV-1, where the former is lower than in HIV-1 (WHO, 1995).

HIV has an outer membrane or envelope about 0.014 um thick, because of its glycoprotein content; this envelope has been found to be extremely susceptible to distribution by heat, household detergents, bleach and alcohol. Inside this outer glycoprotein coat are the “core” proteins encoded by the gag gene. The envelope of the virus (glycoproteins with relative molecular mass of 41.000 and 120.000) is encoded by the env gene with the pol gene is responsible for the production of an important enzyme, the reverse transcripts, which involves the virus to manufacture DNA from RNA. The late gene appears to play a critical role in the regulation of viral
replication and a possible factor in the pathogenesis of AIDS. The virus is 1/10,000th of a millimeter in diameter (Mann, et al., 1992).

The immune system of AIDS cases is damaged, particularly due to the destruction of the helper T-lymphocytes by the virus. These cells regulate all the immune functions of the human body and also the activation of B-lymphocytes responsible for antibody production. Other T-lymphocytes are responsible for killing viruses and tumor cells and the monocytes that are responsible for killing many parasites and bacteria. The virus does not infect many T4 cells at one time; it kills those infected once they are immunologically activated. The virus essentially converts the T-cell from lymphocyte to an AIDS virus factory. The damaged T-cell produces the virus which subsequently invades other T-cells. The mechanism of immune response to infection suffers considerably, and thus the AIDS victim is left vulnerable to an array of life-threatening infections and malignancies (WHO, 1995).

HIV targets two groups of white blood cells called CD4+ lymphocytes and monocytes macrophages. CD4+ cells and macrophages help recognize and destroy bacteria, viruses or other infectious agents that invade a cell and cause a disease. In an HIV-infected person, the CD4 lymphocytes are killed by the virus, while the macrophages act as reservoirs, carrying HIV to a number of vital organs (UNAIDS, 2006).
HIV attaches itself to the CD4 lymphocyte and makes its way inside. This causes the cell to produce more HIV but, in doing so, the cell is destroyed. As the body’s CD4 cells are depleted, the immune system weakens and is less able to fight off viral and bacterial infections. The infected person becomes susceptible to a wide range of "opportunistic" infections, such as pneumocystis carinii pneumonia, which rarely occurs in persons with normal immune systems (UNAIDS, 2006).

A pattern of highly unusual infections was caused by an unknown entity in the early 1980s that apparently attacked the body’s immune system. It became known as AIDS between 1983-1984 (UNAIDS, 1999).

Researchers isolated HIV as the cause of AIDS. This made possible a blood test for antibodies to the virus. HIV may have been infecting some human populations relatively benignly for more than 20 years (UNAIDS, 1999).

### 1.4.7. Incubation Period:

The incubation period is not known exactly. The period from infection to the appearance of definite signs and symptoms of the disease seems to range from 6 months to several years. The main incubation period is approximately one year in children and more than five years in adults. It seems to be related to the infective dose being shorter among cases infected through blood transfusion and age of the infected being short (average 8 months) among babies infected during pregnancy. Within five years from
infection, approximately 25% of infected persons will develop AIDS and a similar percentage will develop the pre-AIDS condition, i.e. the stage known as AIDS - related complex (ARC). The risk of the remaining infected persons contracting the disease increases at the time since infection increases. Within 10 years, nearly 50% of infected persons develop AIDS. There are many factors that can help some infected persons to develop symptoms more than others. These include repeated exposure to infection with diseases such as tuberculosis and malaria, which compromise the immune functions. Other factors include pregnancy and possibly genetic factors, age at infection and the pathogenicity of HIV strain causing infection (WHO, 1995).

1.4.8. Source of infection:

The virus has been found in great concentrations in blood, semen and cerebro-spinal fluids (CSF). Little concentrations have been defected in tears, saliva, breast milk, urine and cervical and vaginal secretion. HIV has also been isolated in brain tissue, lymphnodes, bone marrow cells and skin. To date only blood and semen have been conclusively shown to transmit the virus (Park, 1995). There is no evidence that the virus can be transmit by the respiratory or enteric routes or by casual person to person contact, including that, which may occur in house hold, social work, school camp or prison environment, also there is no evidence that transmission involves insects, food, water, toilet, swimming pools, seats, shared eating and
drinking Utensils or other items such as second hand clothing (WHO, 1995).

1.4.9. **Mode of transmission:**

HIV has been isolated from blood, semen, vaginal and cervical fluids, breast milk, saliva, tears and urine (Park, 1995). All epidemiological studies indicated that there were mainly three basic modes of transmission i.e. sexual intercourse, transmission by contaminated blood or blood products or contaminated skin piecing instruments and from an infected mother to her child (UNAIDS, 2006).

1.4.9.1. **Sexual intercourse transmission:**

HIV is fundamentally a sexually-transmitted virus, which is transmitted by both heterosexual and homosexual intercourses; this is the main mode of transmission, being responsible for probably 90% of the cases of infection. Heterosexual transmission exceeds homosexual transmission (60% - 40%). The risk of infection varies with the nature of the sexual act involved. Certain sexual practices increase the risk of infection e.g. number of sex partners and the presence of an ulcerative sexually, transmitted diseases. Unprotected vaginal and anal sex both involve a high risk. The unprotected anal sex is more risky, because the mucosa lining the rectum is more fragile than that of the vagina and so more likely to have lesions or tears that allow the passage of the virus. Sexual contact with prostitutes implies a higher risk (WHO, 1995).
In USA, over 70% of the cases were in homosexual or bisexual men. In contrast, in Equatorial Africa, AIDS is acquired mainly through heterosexual contact. Every single act of unprotected intercourse with an HIV-infected person exposes the uninfected partner to the risk of infection. The size of the risk is affected by a number of factors, including the presence of STDs, the sex and age of the uninfected partner, the type of sexual act, the stage of illness of the infected partner and the virulence of the HIV strain involved. A European study of 563 heterosexual couples in which only one partner was infected at the start, suggests that chances of transmission of HIV infection from male to female is twice as likely as from female to male. Generally, women are more vulnerable to HIV infection because a larger surface is exposed, and semen contains higher concentration of HIV than vaginal or cervical fluids (Park, 1995).

1.4.9.2. Transmission by contaminated blood and blood products:

In places where a safe blood supply is not guaranteed, those receiving transfused blood have an increased risk of being infected with HIV. In most industrialized countries, the risk of acquiring HIV infection from transfusions is extremely low. This is due in large part to effective recruitment of regular, volunteer blood donors; improved donor testing procedures; universal screening of blood and blood products with highly sensitive and specific tests for the antibody to HIV, and the appropriate use of blood. In the developing world, however, the risk is much higher. One
estimate is that up to 5% of HIV infections may be caused by transfusions in high-prevalence areas such as sub-Saharan Africa. The lack of coordinated national blood transfusion systems, the absence of non-remunerated volunteer blood donors, and lack of testing and inappropriate use of blood products compound the problem (UNAIDS, 2006).

To prevent transmission by tissue and organ donation, including sperm for artificial insemination, the HIV-infection status of the donor should be carefully evaluated (UNAIDS, 2006).

**1.4.9.3. Transmission by skin-piercing instruments:**

HIV can be transmitted through the use of HIV-contaminated needles or other invasive instruments. The sharing of syringes and needles by injecting drug users is responsible for the very rapid rise in HIV infection among these persons in many parts of the world. A risk is also attached to non-medical procedures if the instruments used are not properly sterilized. Such procedures include ear-and body-piercing, tattooing, acupuncture, male and female circumcision, and traditional scarification. The actual risk depends on the local prevalence of HIV infection. HIV transmission by means of injection equipment can also occur in health care settings where syringes, needles and other instruments, such as dental equipment, are not properly sterilized, or through injury by needles and other sharp tools (UNAIDS, 2006).
1.4.9.4. Transmission from an infected mother to her child:

Mother-to-child transmission (MTCT) is the over-whelming source of HIV infection in young children. The virus may be transmitted during pregnancy, labour, and delivery or after the child's birth during breast-feeding. Among infected infants who are not breast-fed, most MTCT occurs around the time of delivery (just before or during labour and delivery). In populations where breast-feeding is the norm, breast-feeding may account for more than one-third of all cases of MTCT transmission. Paediatric AIDS can be difficult to diagnose because some symptoms of HIV infection, such as diarrhoea, are also common in infants and children who are not infected. Therefore, these symptoms cannot be considered a reliable basis for diagnosis. There are blood-based tests, for example, ELISA, which is reliable only at 15 months of age, and PCR tests that allow early diagnosis, but these tests are quite expensive and are not readily available in developing countries (UNAID, 2006).

1.4.10. How HIV can not transmit?:

Family, friends and co-workers should not fear becoming infected with HIV through casual contact with an HIV-infected person at home, at work, or socially. These activities will not transmit the virus, shaking hands, coughing or sneezing, using a public phone, visiting a hospital, opening a door, sharing food, eating or drinking utensils, using drinking
fountains, using toilet or showers, using public swimming pools and getting a mosquito or insect bite (UNAIDS, 2006).

1.4.11. Signs and symptoms:

WHO classified signs and symptoms in adult AIDS as major and minor signs (Park, 1995).

1.4.11.1. Major signs:

- Fever more than one month.
- Weight loss more than 10 percent of body weight.
- Diarrhoea for more than one month.

1.4.11.2. Minor Signs:

- Cough for more than one month.
- Generalized pruitic dermatitis.
- Recurrent herpes zoster or shingles.
- Oropharyngeal candidiasis or thrush.
- Chronic or aggressive ulcerative herpes simplex.
- Persistent generalized lymphadenopathy.

WHO has developed criteria for diagnosing symptomatic HIV infection, as an AIDS to individual case management. Symptomatic HIV infection can be recognized clinically without testing for HIV antibodies. The diagnosis of symptomatic HIV based on the history and physical examination of the patient. A person has symptomatic HIV infection if there are one or more cardinal findings, two or more associated findings,
together with any risk factors (found by taking case history) two associated findings with a positive HIV test result (Park, 1995).

1- **Cardinal findings:**

Kaposi sarcoma (lesions in the mouth or generalized or rapidly progressive): - Oesophageal candidiasis.

- Cytomegalo virus retinitis.

- Pneumocystis carinii pneumonia.

- Toxoplasma encephalitis.

2- **Characteristic findings** (if no other obvious cause of immune suppression such as malnutrition is present):

- Oral thrush (in a patient not taking antibiotics).

- Hairy leukoplakia (white patches on the sides of the tongue in vertical folds resembling corrugations).

- Cryptococcal meningitis (a fungal infection in the central nervous system which is usually present with fever, headache, vomiting and neck stiffness).

- Milliary, extra pulmonary or non-cavity pulmonary tuberculosis (disease in lymph nodes, lung or heart walls or in lung, often without cavities showing on X-rays).

- Herpes zoster or shingles (present or past, particularly if the patient is not elderly).

- Severe prurige.
- Kaposi sarcoma (other than type described as cardinal findings).
- High-grade B-cell extranodal lymphoma (tumor of lymph cells frequently located in the gut or central nervous system).

3- **Associated factors:** (if no other obvious cause of immune suppression is present):

- Recent and/or unexplained weight loss of more than 10% of the body weight.
- Fever (continuous or intermittent) for more than one month.
- Diarrhoea (continuous or intermittent) for more than one month.
- Ulcers (genital or around the anus) for more than one month.
- Cough for more than one month.
- Neurological complaints or findings, including seizures, peripheral neuropathy (degeneration of the nervous system) dementia, progressively worsening headache.
- Generalized lymphadenopathy.
- Drug reactions (previously not seen) e.g. to thiacetazaone.
- Severe or recurrent skin infections.

4- **Possible risk factors for HIV infection:**

A. Present or past high-risk behavior:

   i. Unprotected penetrative anal or vaginal sex with several sex partners.
   
   ii. Drug injection with shared syringes and needles.
iii-Sex partners with someone with known risk factors.

**B.** Recent history of an STDs, particularly genital ulcer diseases.

**C.** History of unscreened blood or other transfusion or from an area with high prevalence of HIV-infection, even if screened.

**D.** History of scarification, tattooing, ear piercing or circumcision using non-sterile instrument (Park, 1995).

**1.4.12. Prevention and control:**

Control of HIV infection has become a public health priority in many countries of the world, with no treatment widely available and no vaccine in sight for the near future (WHO, UNESCO, 1992).

All forms of HIV transmission are preventable. Moreover, even when a cure is found, prevention will continue to be the most important strategy in the struggle against AIDS. There is sufficient information on the modes of transmission to permit national authorities to initiate prevention and risk reduction measures to limit the danger of infection (WHO, 1995).

**1.4.12.1. Prevention of sexual transmission:**

Public health education must stress this fact and the necessity to refrain from sexual relations outside marriage (WHO, 1993). Changing sexual behaviour through health education, even if only partially effective, would thus have a significant impact on the further spread of AIDS. It would also help control other sexually-transmitted diseases, which are associated with significant morbidity and sequel. Creative educational
approaches and respecting cultural traditions are necessary to make the population aware of the dangerous of HIV-infection and AIDS to encourage protective measures. The most important target groups for education programmes are individuals exhibiting high-risk behaviour, and their sex partners. Depending on the area in practice that may mean all sexually active men and women, but particularly those with sexually-transmitted diseases (STDs), prostitutes and "free women" and adolescents (Collazo, 2000).

Reducing the risk of sexual transmission is based on:

- Limiting the number of sex partners.
- Avoiding unsafe sex practices.
- Using condoms.

Both men and women have to be aware of the need to use condoms for their own protection and that of others (WHO, UNESCO, 1992).

Attention should be given to adopt the communication technology to the local situation and needs in order to develop a successful health education approach; one focus must be on educating youth before they are sexually active. They need not only information but also they need to be taught the necessary skills to avoid high-risk situations. Efforts should be made to benefit from the strong religious beliefs in promoting healthy lifestyles, and refraining from unhealthy ones, including promiscuous sexual relations (Collazo, 2000).
1.4.12.2. Prevention of blood-borne transmission:

Blood-borne transmission of HIV can occur whenever HIV from one infected person enters the bloodstream of another person, as one donated blood or when blood products are transfused or organs transplanted into a recipient, when surgical or other equipment used for injections and invasive procedures is reused without adequate sterilization in the health care setting or when drug users share unsterilized equipment. Attention should be given to this potential mode of transmission through:

i- Avoiding blood transfusion if not seriously needed. It should not be considered for trivial reasons.

ii- Screening of blood and blood donors. The general rule would be to screen all blood units and also blood donors for the presence of antibodies against HIV. In areas where HIV-infection rates are low and in order to cut on the cost for blood screening for HIV infection, pooling of up to five samples can be made.

If blood cannot be screened, ways to exclude donors with higher risk for AIDS have to be considered through:

- Voluntary-self, exclusion systems in which persons practicing risky behaviours refrain from giving blood. This may be achieved through donor education.

- Obtaining the history of possible exposure to a known risk as well as inquiring about suggestive symptoms such as chronic diarrhoea, and
weight loss. This is easy when blood donation is free, but where donors are paid this may not be an easy task as such donors will hide symptoms.

- Physical examination of the donor; although not feasible in all blood collection settings, should be encouraged because it can identify unusual mucosal or skin lesions, lymphadenopathy, or wasting.

iii- Ensuring production of blood products in a manner which eliminates the risk of HIV transmission (WHO, 1995).

1.4.12.3. Prevention of transmission through injections and skin-piercing instruments:

HIV transmission can occur through injections and the use of contaminated skin-piercing instruments. Efforts are needed to ensure that instruments used for injections and other skin piercing instruments such as lancets for taking blood drops for laboratory examination of blood, ear piercing and tattooing, are safe and not contaminated (WHO, 1995).

As injecting drug use comprises one of the highest risk factors for contracting HIV infection, efforts should be made to attempt to reduce this risk. The socio-cultural context of drug injections is of critical importance in any efforts either to understand or to change the risk behaviour associated with transmission of HIV. The provision of sterile injection equipment is unlikely to be sufficient to bring about cultural change in drug injectors behaviour, but changing the socio-cultural context and the societal
response to drug use is probably the most effective way of ensuring the ultimate aim of prevention of HIV transmission through this route. Health education programmes should be used to inform the population about the risk of HIV transmission through contaminated needles and other skin-piercing instruments (WHO, 1995).

1.4.12.4. Prevention of prenatal transmission:

Preventing prenatal transmission of HIV-infection means essentially preventing HIV in women of childbearing age (WHO, UNESCO, 1992). Infected women should be advised against pregnancy, both for their own health and for fear of transmitting infection to the baby. Prevention may also require repeated campaigns to recruit men and women who are considering becoming parents into voluntary testing and counseling before marriage (WHO, 1995).

The prevention of AIDS remains an individual and social responsibility; every individual should be sure that he adopts a lifestyle, which keeps him safe from AIDS. On its part, society should provide all that is necessary to help individuals to protect themselves against AIDS. This includes the provision of information on the disease and increasing people awareness of all aspects of AIDS problems. It includes facilitating marriage for young men and women and helping them to preserve chastity (Gazairy, 1995).
1.4.13. HIV Surveillance:

Surveillance is the collection of epidemiological information of sufficiency, accuracy, and completeness with respect to the distribution and spread of infection and diseases, to be pertinent to the planning, implementation and monitoring of programme prevention and control of activities. In other words, surveillance is the collection of information for action. Data from surveillance of the human immunodeficiency virus can be used for various purposes including securing high level commitment to action; targeting activities for different population groups and areas; programme monitoring, evaluation, development, testing of intervention methods, mobilization and allocation of resources. Surveillance should be an invariable part of any disease control programme (WHO, 1995).

1.4.14. Health education in AIDS:

Health education is the key element in efforts used for prevention and control of HIV infection. Health Education Programmes designed to change sexual and other risk behaviour is the most approach for reducing the spread of human immunodeficiency virus (HIV). Strategies for prevention and modes of transmission of the disease need to be through effective Health Education Programmes containing a simple and understandable message (Hira, et al., 1995).

AIDS education in schools is receiving national attention and given significant resources in North America, Australia and Europe. WHO and
UNESCO have global plans for school health education on the subject. A guide to education on AIDS and sexually-transmitted diseases in schools has been prepared. WHO supports the documentation center on educational materials for AIDS education in schools at UNESCO, Paris. Prior to launching national AIDS education programmes in schools, WHO and UNESCO are supporting pilot projects in Ethiopia, Jamaica, Mauritius, the Pacific area and Sierra Leone. Tanzania and Venezuela have initiated projects and others are being planned for Argentina and Uganda. Project activities include the development of curricula based on the existing knowledge, attitudes and behaviours concerns of children- curricula that are nevertheless sensitive to local culture and acceptable to parents and teachers. Educational techniques include the minor media such as drama, art and songs. AIDS booklets and materials form part of the project (WHO, UNESCO, UNICEF, 1992).

There are several cultural factors that can promote or hinder the success of health education programmes in developing countries. The future of health education promotion lies in the ability to centralize these cultural factors within its proper historical and political context. For health promotion interventions, particularly in countries of Africa, a culturally sensitive method must be employed by health educators so as to examine varied health behaviours in terms of positive-beneficial beliefs that must be
encouraged, and existential-cultural beliefs practices that should be changed (Airhihenbuwa, 1993).

The types of health education methods are determined according to the relationship between health educator and the people (direct or interpersonal) and indirect (WHO, 1988).

In the direct methods there is personal contact between health educator and the people. These methods can be used on an individual basis (counseling, group discussions) (WHO, 1988).

The dialogue on an individual basis is useful technique on any occasion that health personnel and users of the health services come together. A dialogue takes place if the health personnel learn to listen to people/individual concerns and problems and there is a sharing of knowledge and experiences. For this to happen, people have to feel at ease and confident (WHO, 1988).

The health talks are a common technique of transmission of knowledge. It should only be used when requested by the people and should answer the needs and interests of the participants; the talks should be short and always be followed by some time for questions and clarifications (WHO, 1988).

Demonstrations are useful for the development of skills. Participants can observe how the process takes place. In the group discussion, people come together to discuss their health problems. The health educator
facilitates the process, encouraging people to express their ideas and concerns. To start the discussion different methods can be used to present various aspects of the day-to-day life, to stimulate reflection. By means of drama (role-play, socio-drama, etc.), case studies, drawings, pictures or stories problems relevant for the group can be introduced. This is called the problem-posing approach. Afterward, the facilitator will ask questions for reflection (What happened?), the analysis of the problem (who were involved?), to understand the causes (Why did it happen?), to relate to their own lives and to think about people actions to deal with (What can we do?), (When are we going to do it?), (WHO, 1988).

In the indirect health education methods, there is no direct contact between the health educators. The information is provided through different media, such as leaflets, booklets, posters or mass media like newspapers, radio or television. In these cases there are no interactions, so that people only passively receive the messages and no clarification of doubts is possible (WHO, 1988).

Drama, songs and stories are also frequently used to transmit messages of health without giving the pressibilty for discussion or clarification of contents (WHO, 1988).

These methods can be useful to give information about specific events or to create an appropriate environment of when a large interpersonal
health education programme will take place or try to introduce short-term changes of behaviour (WHO, 1988).

Audiovisual aids are important in the health education armamentarium. They can be conveniently classified into three groups—purely auditory, purely visual and combination of both systems (Park, 1995).

Auditory aids comprise tape recorders, microphones, amplifiers, earphones, etc. The tape recorders are extensively used as teaching aids (Park, 1995).

Visual aids requiring projection are slides, film strips, epidiascopes, overhead projectors, silent films, etc. Visual aids not requiring projection are chalkboard (blackboards), flannel graphs, exhibits, models, specimens, posters, etc (Park, 1995).

Combined audiovisual aids built in one piece, slide-tap combination, sound films and closed circuit television, etc. Audiovisual aids are increasingly being used in modern education. It has been found that audiovisual aids, when properly used in teaching situations, reduce meaningless word-responses of students and have a high degree of interest for students. They also provide experiences not easily obtained through other materials (Park, 1995).

For group health education, lectures are the most widely used method of teaching. It is not a good method because communication is mostly
"one-way". The lecture method can be made effective when combined with films, charts and flannel graphs, etc (Park, 1995). Group discussions are considered a very effective method of health teaching; it is a "two-way" communication. This method is useful when the groups have common interest and similar problems (Park, 1995).

Simulation exercises are confronted with a learning situation that is close to real life in the form of an exercise. Role play is one of simulation exercises (Park, 1995).

"Mass media" of communication, these are television, radio, press, films, health magazines, posters, health exhibition and health museums. Mass media are generally less effective in changing human behaviours than individual or group methods because communication is "one-way". Nevertheless, they do have quite an important value in reaching large numbers of people with whom there is no contact (Park, 1997).

Counseling on HIV/AIDS is to support the ability of infected persons and those who care for them to cope with the stresses of HIV/AIDS to prevent the transmission to others. Counseling is necessary before and after HIV–testing. Effective counseling depends mainly upon counselor skills such as the use of appropriate time and resource available, active listening, effective questions and patient respect and confidentiality (Mann, et al., 1992).
From a prevention stand-point, identifying those who have never heard about AIDS is important. This identifying the characteristics of those who have not heard about AIDS is a first step in reaching those who are not being informed through standard education programmes and media coverage (Gary, et al., 1989).

Authorities feel that effective education programmes are needed to assist in combating AIDS and preventing discrimination against high-risk groups (Mason, 1988).

The factors involved in preventing the spread of AIDS, in addition to preserving civil rights of those with AIDS, are complex issues involving sensitive and emotional concepts (Dickens, 1988).

Learning experiences that address both cognitive and affective domains may be more successful for AIDS education than experiences that present only factual information (Read, Greene, 1976).

Particular drama, which depicts the homosexual life style and probable death of the main character, could create fear and confusion because of the emotional and moral issue involved (Claudia, 1989).

Knowledge and beliefs regarding AIDS were found to be relatively independent of gender, age, education and sexual orientation (Dawson, et al., 1988).

Television's importance as the major source of AIDS-related information suggests the dominant role of mass media as a vehicle for such

1.4.15. UNAIDS Outcome Frame Work 2009 – 2011:

1- Reduce sexual transmission of HIV.

2- Prevent mothers from dying and babies from becoming infected with HIV.

3- Ensure that people living with HIV receive treatment.

4- Prevent people living with HIV from dying of tuberculosis.

5- Protect drug users from becoming infected with HIV.

6- Remove punitive laws, policies, practices, stigma and discrimination that block effective responses to AIDS.

7- Stop violence against women and girls.

8- Empower young people to protect themselves from HIV.

9- Enhance social protection for people affected by HIV.

(UNAIDS, 2009)


The goal is to reduce the prevalence of HIV / AIDS to a level that renders HIV/AIDS not to be a public health problem through a multi-sectoral national response.

1.4.16.1. The objectives of the plan:

1- To maintain the current level of HIV/AIDS prevalence at less than 2% by 2009.
2- To reduce AIDS morbidity, mortality and improve the quality of life of people living with HIV/AIDS.

3- To build the capacity of the different partners involved in the prevention and control of HIV/AIDS and to enable them to participate effectively in the national response.

4- To mobilize political and community leaders to ensure their commitment, coordinate national and international resources for HIV/AIDS prevention and control activities (SNAP, 2009).

1.4.16.2. The specific objectives of the strategy:

1- To increase awareness and knowledge about HIV/AIDS, its mode of transmission and methods of prevention.

2- To encourage traditional believes and practices that will enhance the positive behaviour that enables the youth to get married, discourage illegal sex outside marriage, and discourage negative sexual behaviour among youth, university students and other risk groups.

3- To review current legislations for combating communicable diseases and include HIV/AIDS in the list of communicable diseases.

4- To organize, implement and plan information dissemination, advocacy campaigns targeting all sectors concerned with the HIV/AIDS problems including government authorities, private sector, NGOs, civil society organization the community and people living with HIV/AIDS.
5- To ensure availability of treatment for STIs in all health units throughout the country.

6- To eliminate transmission of HIV/AIDS through blood transfusion by screening blood donations in all health units.

7- To use appropriate methods to reduce mother-to-child transmission of HIV/AIDS.

8- To provide voluntary testing and counseling in government and private health institutions.

9- To provide treatment including antiviral therapy treatment for opportunistic infections and a nursing care for people living with HIV/AIDS.

10- Strengthen the HIV/AIDS surveillance system and provide the information that will assist in the monitoring and evaluation of the prevention and control measures.

11- To encourage research that will assist in the control of HIV/AIDS.

12- To organize and support the managerial component of SNAP.

(SNAP, 2009).

1.4.17. Concepts and beliefs and previous studies:

In Sudan an AIDS-related knowledge study was carried out on a sample of 462 high secondary school teachers and students, in Kassala, eastern Sudan. The results showed high scores of knowledge about AIDS-transmission and general knowledge about the disease. However, there was
a high frequency of AIDS-related misconceptions, especially among teachers and students. The study calls for more focus on these misconceptions in health education campaigns regarding AIDS (Elzubier, *et al.*, 1996).

A study in Moyo, Northern Uganda was conducted to assess if teachers who have attended participatory AIDS workshops talk about AIDS in the classroom and if condom issues are discussed as an STDs/AIDS preventive option with school children in the Sudanese refugee camps, (63%) of teachers who attended the workshops talk about STDs/AIDS to their pupils and the community and (29%) of them talk to their friends, relatives and church community, (24%) said they discussed condom issues at school, (16%) of teachers who did not speak about condoms said that “condoms increase immorality” which is against the teachings of the Bible or the Koran. The results suggest that the programme should organize regular participatory STDs/AIDS workshops for teachers and develop a curriculum to integrate STDs/AIDS into the regular education (Arkangel, 1996).

A study was conducted in Northern Uganda to assess the impact of AIDS information dissemination among Sudanese refugees after a 3-year IEC program. The study revealed that Sudanese refugee women had little knowledge and practices regarding condom use which may lead to increase susceptibility to HIV infection. This result is prompting the
programme to put a special emphasis on interventions targeted at refugee women (Dralobu, et al., 1998).

A cross-sectional study was conducted on knowledge, attitudes and practices (KAPs) among students at schools in Byumba in Rwanda. The mean age of students participating was 20 years. Prior sexual experience was reported by (21%) of females, and (63%) of males. Knowledge on AIDS was good (80%) of questions were answered correctly. Students who had participated in an AIDS Club scored significantly higher in the knowledge part (P = 0.01), and had a more positive attitude towards AIDS (P = 0.04). Areas where the knowledge was less complete include the transmission by mosquitoes and shared glasses and the fact that infected people may be without symptoms and appear healthy. The results indicate that AIDS clubs did improve the KAPs of students significantly and the educational programme can be improved (Uhagaze, et al., 1999).

A study was conducted in Ghana aiming to provide students with current and accurate information on HIV/AIDS that would eventually lead to a change in behaviour and to use students as agents of change among families and peers. Twenty student members underwent training to reach out to other young people between 10 – 35 years. Particular attention was taken to involve PLWHAs. The results revealed that many students gained knowledge on the modes of transmission and prevention, care and support as well as the rights of PLWHAs (Aryeetey, 2000).
The majority of Zambian youth (75%) are sexually active by the age of 19. HIV/AIDS prevalence is very high among young people (20% urban, 13% in rural areas). The Government challenged the youth of Zambia to play a greater role in programmes for their peers. Phase one of the study to design the mass media campaign, youth were involved in the planning, designing, implementation, monitoring and evaluation. As a result of the activities, 5 television and 3 radio spots are currently being aired on national broadcasting stations with message focusing on abstinence, consistent use of condoms, IEC materials such as posters, stickers, exercise books, messages on buses and 2 songs and musical videos complement these preliminary results of the focus groups indicate high levels of comprehension and acceptance of the messages as well as reported discussion of the spots with peers and parents. The second phase shows a significant impact in the behavior of young people related to safer sex as a direct result of the intervention (Hachonda, et al., 2000).

A study was conducted in Blantyre, Malawi, about traditional education where a student has been passively receiving input from a teacher. Residents of Blantyre, Malawi, have been the recipients of a lot of such AIDS education from health experts, leaflets and radio messages. A study to initiated discussion groups and given a chance to answer back participants doubts, questions, gossips, complains, act out and generally give as good as they get, in an interactive approach to AIDS education. The
study concluded that an interactive approach has helped to overcome some of the perceived social norms at a neighbourhood level and leads to personal behavior change with the group support and sharing of experiences (Bacon, *et al.*, 2000).

A study in Niger Delta Region about youth high risk behaviour for STDS/AIDS and unwanted pregnancies without knowing the degree of risk they are open to. The evangelization and role model presentation is a system devised after a careful study. The strategy aims at reaching out to youths within the age bracket of 14 – 25 in the rural communities of the Niger Delta area. One on one, the approach was taken after FGDs revealed that these youths do not know the consequences of their actions and are ill-equipped educationally to combat the challenges ahead. Also included in the project the youths of these communities at a school, pubs and fishing settlements. Leaflets, handbills, fertility regulating charts and condoms were distributed with proper demonstrations on how they are used. Results revealed a wide spread acceptance of this programme and that these ignorant youths could become role models for other youths and their communities (Pinnch, 2000).

A study was made in twelve Asian countries about school– based HIV/AIDS education in primary and secondary schools. Most participating countries are developing school- based HIV/AIDS and sex education policies. At secondary school level the dominant prevention strategies are
the promotion of monogamy and abstinence, although reference is often made to safe sex practices, such as the use of condoms. At the primary school level most countries provide only basic sex and HIV/AIDS messages, often with an emphasis on abstinence. In poorer countries, as only a minority of students’ progress to the secondary level, most young people do not currently receive comprehensive sex education at school. In this context peer education assumes an important role. Ongoing monitoring of sex educational programs in countries that differ in terms of their local epidemics and in terms of different religions and moral majorities will in the long term provide some answers to the question of how best to build effective HIV prevention strategies among youth (Kippax, 2000).

A study was made in Mongolia, a country which has low prevalence of HIV infection but many risk factors e.g., increasing rate of STDs, low condom use, increased international travel and rapid social change. Previous interventions focused on HIV/AIDS education but resulted in little impact. The government has been proactive in implementing a sexuality education program. The processes used to increase acceptability, develop knowledge and skills for curriculum development and teacher training. That resulted in a curriculum being introduced into the formal school system and teachers who feel comfortable teaching the material and using new interactive methods. The study concluded that comprehensive sexuality education, rather than HIV/AIDS education, is a useful strategy
for engaging young people and preventing HIV in a low prevalence context with adequate preparation. Key factors in program success include generating support through advocacy and adequate teacher training to build comfort and familiarity (Delegchoimbol, 2000).

A study was carried out in Ibadan, Nigeria, to assess a school-based AIDS education programme for secondary school students. Sexually active students are at risk of contacting STDs, including HIV infection. As a result, health education initiatives are there to increase level of knowledge, influence attitudes and encourage safe sexual practices, but the effectiveness of these programmes have not been evaluated. In this study, the knowledge, attitudes and sexual risk behaviors of 223 students who received a comprehensive health education intervention were compared with 217 controls. At post-intervention survey, students exhibited greater knowledge about HIV/AIDS transmission and prevention (P < 0.05). Intervention students were less likely to feel that AIDS is a white man's disease and were more likely to be tolerant of people living with the disease (P < 0.05). After the intervention, the mean number of reported sexual partners among the experimental students significantly decreased from 1.51 to 1.06, while it increased from 1.3 to 1.39 among the controls. The study concluded that students can benefit from specific education programmes that transmit important information necessary to prevent risky behavior and improve knowledge and attitudes on HIV/AIDS (Fawole, et al., 1999).
A study was made in USA to assess AIDS prevention curriculum using health belief, social cognitive and social influence models including condom use negotiation and refusal of sex. A study sample was 739 experimental students and 577 controls in 9th and 11th grade. At 3-month follow-up, there was a significant reduction in experimental group was compared to controls in sexual intercourse with partners who used drugs intravenously (P < 0.05). Greater monogamy (P < 0.05), and consistent condom use (P < 0.05) in experimental group compared to controls. No significant difference in changes to rates of abstinence from pre-test to post-test (P = 0.06) (Walter and Vaughan, 1993).

A study was carried out in USA, eight sessions including self-esteem, STDs communication, decision-making, sexuality in workshops plus sessions using role-playing for skills and negotiation rehearsal. The mean age of students was 15.1 years. The findings were a greater reduction from baseline to immediate follow-up in frequency of intercourse in the last 2 months for experimentals (3.5/month to 1.19/month) than controls (3.95/month to 2.74/month) P <0.05, a significant increase from baseline to immediate follow up in contraceptive use due to intervention (P < 0.005) 0 (Smith, 1994).

A study was made in Houston and Milwaukee, USA. The objective of the study was to disseminate accurate information about HIV. Two AIDS information hotlines were collected and examined to determine the AIDS
information needs of the general public. N = 1611 were independently classified into 30 content areas, with two independent raters achieving 94% agreement. The content areas were organized for analysis into 11 broader information domains. Questions about HIV antibody testing were the most frequently asked (27%), followed by questions about sexual transmission of HIV (16%), HIV-related symptoms (16%) and situations that do not confer risk for HIV infection (14%). Content analyses suggested that individuals were motivated to call hotlines for fear of contracting HIV from actual risk behaviors. Results suggest that HIV information dissemination to the public can be through hotlines and other means of direct health education (Kalichman and Belcher, 1997).

Another study was made in USA, a sampling was 560 students in experimental group and 419 in control one. Males and females in 9th and 12th grade. 15 sessions over one semester HIV prevention using social cognitive theory on risk behaviour norms, factual knowledge and skills development. At 6 – month follow up no difference in initiation of coitus in experimental (16%) compared to controls (17%) P = 0.98., or frequency of intercourse in those active at pretest (P = 0.533) of those sexually active at pretest, experimental group reported fewer sexual partners in past 2 months compared to controls at post–test (P = 0.046) (Main, et al., 1994).

A study was carried out among 1041 students in secondary schools and colleges in Dar-es-salaam, Tanzania, with an aim to evaluate the
relationship between HIV-risky sexual behavior and anti-condom bias, as well as with AIDS-related information, knowledge, perceptions and attitudes. Self-reportedly, 54% of students (75% of the boys and 40% of the girls) were sexually active, 39% had a regular sexual partner and 13% had multiple partners in the previous year. The condom use rate was higher than previous reports. However, 30% of sexually active respondents did not always use condoms (Risk-1 behaviour) and 35% of those with multiple partners in the previous year did not always use condoms (Risk-2 behaviour). Multiple logistic regression analysis indicated that sex partner hates condom had association with both Risk-1 behaviour (OR 2.47; 95% CI 1.58 – 3.85) and Risk-2 behaviour (OR 2.47; 95% CI 1.10 – 5.48). Use of condom prevents HIV infection, also had association with both Risk-1 behaviour (OR 2.09; 95% CI 1.19 – 3.67) and risk-2 behaviour (OR 3.73; 95% CI 1.28 – 11.03). Students engaging in risk behaviour were aware of the risk, even though they failed to change their behaviour reasons for the AIDS epidemic among Tanzanian students and the importance of more effective AIDS education are also discussed (Maswanya, et al., 1999).

Another study was carried out in a large Midwestern universities with an aim to provide information about medical students’ attitudes and knowledge regarding AIDS. Results indicated that: students with homosexual and/or HIV positive friends were significantly more tolerant towards AIDS patients, over half the students believed that treating AIDS
patients may be hazardous and that their education had not prepared them
to treat these patients safely, one third believed they had the right to refuse
to treat AIDS patients and AIDS phobia was significantly associated with
homophobia. These data suggest that medical educators may need to help
students overcome AIDS–phobia before some students will be able to
incorporate instruction about AIDS since AIDS phobia may inhibit this
learning. Didactic instruction must be coupled with modeling by educators
of non-prejudicial attitudes and strict adherence to medical professionalism
(David, et al., 1999).

A study was made in the Republic of Ireland; the objective of the
study was to know the effects of a participatory programme on Irish pupils’
attitudes to HIV/AIDS. A programme of five classroom sessions, structured
to encourage active participation, was administered to an experimental
group of 20 participants (10 males – 10 females). There was an equivalent
control group. Attitudes towards 10 AIDS-related person concepts were
measured before and after the programme using semantic differential rating
scales. Highly significant differences were found between groups in post –
programme attitudes to the concepts. There were no gender differences. It
is concluded that this participative programme strongly influences AIDS –
related attitudes and, in particular, promotes compassion towards those
with HIV/AIDS (Swain and Namara, 1997).
A study was carried out in United States of America to study adolescent problem behaviour in the seven middle schools in one USA school district. Out of 4668 grade 6-8 students enrolled, 4263 (91.3%) completed the study. Students school bonding was positively correlated with school adjustment \( (r = 0.49) \) and perceived school climate \( (r = 0.77) \) but inversely correlated with problem behavior \( (r = -0.39 \text{ to } -0.43) \). Problem behavior was significantly higher \( (P < 0.001) \) among males than females and among students in higher grades. The data support the conclusion that school bonding is associated with problem behavior and multi–component interventions in school designed to increase students-school bonding and prevent problem behavior (Bruce, et al., 1999).

A study carried out in Finland, Latvia, Norway and Slovakia with an aim to examine the effectiveness of classroom teaching in influencing present and future health and health behaviors. Data from 11–, 13–and 15–year old students revealed that the older students tend to be significantly less satisfied with school than the younger ones \( (P < 0.05) \). The most important predictors of students’ satisfaction with school are students’ feeling that they are treated fairly, that they feel safe and that they believe that teachers are supportive. The findings suggest that, in school health promotion interventions, attention needs not only to be given to classroom teaching materials but also to the quality of a student’s school experience and the quality of the relationship with teachers (Samdal, et al., 1998).
A study was made in schools from non–metropolitan Britain. The objective of the study was to evaluate sex education programmes. Results from a questionnaire are presented from 3314 (years 11) students in 25 schools. Over 70% answered that their sex education had included a lot or some education on sexual intercourse, contraception and sexually-transmitted diseases (STDs); (51%) demonstration of condoms; 45% personal morality; and 36% assertiveness training including how to say “No”. Teenagers’ assessment of sex education was varied but only the minority (44%) considered it satisfactory. Over 70% said they thought that a wide range of topics should start at year 8 (aged 11/12 years), most (75%) wanted outside agencies to be involved in the teaching, (57%) did not want parents to provide most of it, and (70%) did not want it taught in single-sex groups. School was the most frequently specified source of “most helpful information on contraception (38%) and STDs (45%). Teenagers within schools perceived to deliver above average input on contraception and STDs were more likely to cite school as their most helpful source of information. Increasing input was not associated with increasing awareness of risks from STDs/AIDS nor was improved knowledge of contraception. The questionnaire and reporting of comparative findings back to the schools will allow an assessment of current practice and future change to sex education programmes (Alex, et al., 1996).
Another study was made in England and Wales with an aim to establishing the importance of school sex education and then outlines the educational policy and context which shapes its provision in England and Wales. It concludes that the devolution of responsibility to individual schools for this potentially sensitive area of the curriculum has created a climate of uncertainly and that a consensus on what should constitute an educational entitlement would allow schools to tackle sex education with greater confidence (Green, 1998).

A study was made in Manila, Philippines, the objectives of the study was to describe the process of development of a school – based AIDS prevention program and to evaluate the effect of this program on students’ AIDS-related knowledge, attitudes and AIDS-preventive behaviors. A cluster-randomized, controlled trial with pre-test/post- test evaluation was conducted in four demographically similar public high schools. Of the 845 high school students who participated in the baseline survey, 804 (95%) completed a post-intervention questionnaire on AIDS prevention program developed by public high school teachers together with local AIDS experts, social scientists and health educators. The results showed that at baseline, 80 (11%) of 804 students reported ever having had sexual intercourse (mean age 14 years). 66 were males and 14 were females (P = 0.001). Among these, condom use was low (24%). Reasons for failure to use condoms were use of other methods (26%) and loss of sensitivity (25%).
After implementation of the AIDS prevention program, the intervention group was more likely to answer correctly that HIV can not be transmitted by mosquito bites ($P = 0.01$), through a cough or sneeze ($P = 0.01$), or by shaking hands with an infected person ($P = 0.01$). Students who had attended the AIDS education program were less likely to avoid people with AIDS and were more compassionate toward them ($P= 0.01$). Changes in knowledge about modes of HIV transmission were associated with improvements in preventive knowledge ($P = 0.001$). While there was no statistically significant overall effect on intended preventive behavior, the program was successful in increasing AIDS-related knowledge and improving attitudes towards people with AIDS. The study concluded that a school-based AIDS prevention program can be developed and implemented in developing countries (Aplasca, et al., 1995).

A study was made in Moyo District, Northern Uganda, to disseminate the AIDS information among Sudanese refugee women. Most refugee women face lack of basic education, and are often separated from their husbands and families, therefore are highly vulnerable socially and economically. The strategy has been to openly discuss sexuality and AIDS with women group leaders and women representatives of various ethnic and language backgrounds and they would give information and organize open discussion sessions among their peers in the camps. The results are
that the majority of trained women leaders have become very active in AIDS prevention education programme (Akwir, et al., 1996).

A study was conducted in Zambia, to study HIV seroprvalence in an African prison establishment. Inmate populations include a large number of individuals at risk of HIV infection. There is insufficient data about HIV/AIDS in prison. The study was designed to address this shortfall. The study concluded that over one in four inmates are HIV seropositive in Zambian persons and most of infection may be from outside, some inmate may get HIV inside. There is an urgent need to develop programmes for the protection of inmates (Simooya, et al., 2000).

A study was conducted in San Francisco aiming to gain information about AIDS knowledge, attitudes and behaviors of junior high school students. 1, 967 students in three junior high schools in an inner city school district were surveyed. Ages of the participants ranged from 11 – 16 years and 48% were males. Ethnically, 33% were Asian, 31% African – American, 24% Latino, and 5% White. African- American students had greater AIDS general knowledge than Asians, and similar general knowledge to Latinos and Whites. Most students wanted to be taught about AIDS in school. Misconceptions about casual contagion of AIDS were common. Students with these misconceptions were more likely to believe that students with AIDS should not be allowed to attend school. A high proportion of students had engaged in high–risk behavior including sexual
intercourse, drinking alcoholic beverages, and using street drugs. These findings support the possibility that improving knowledge about HIV transmission would result in more tolerance toward students with HIV infection and would result in less high-risk behaviour (Siegel, et al., 1991).

A study was carried out in London, England on a randomized controlled trial of peer–led sex education in English secondary schools. 27 schools were recruited and randomly allocated to a programme of peer–led sex education or to act as control schools. In experimental schools peer educators in year 12 (aged 16/17) were recruited in two successive cohorts and having received a standardized training programme, delivered classroom-based sex education sessions to 9 year students (aged 13/14 years). Peer educator reported positive changes in sexual knowledge and changes towards more liberal attitudes. There was an increase in confidence in relationships and on their sexual behaviour (Vicki, et al., 2002).

Another study was made in New Jersey, U.S.A aiming to prepare peer leaders in an urban high school to become peer educators using the program teens for AIDS prevention. Findings were suggested to educate and motivate adolescents to avoid sexual risk behaviors. The peer education programs change positively adolescent risk behaviors because of the influence of peers during adolescence (Mahat, et al., 2006).
A study was conducted in Kabarole, Uganda. A self completion questionnaire was used to survey HIV-preventive cognitions among secondary school students. An encouraging pattern of HIV-preventive beliefs was observed suggesting that health education efforts have been effective in establishing basic transmission knowledge, accurate risk perception and an understanding of effective precautions (Abraham, et al., 1995).

A study in Arusha and Kilimanjaro regions, Tanzania, was conducted in order to test the effects of an HIV/AIDS education program for primary schools children. A quasi-experimental design including baseline and 6-month follow up, schools were randomly assigned to intervention (n = 6) or comparison (n = 12) a total of 2026 sixth and seventh grade pupils (average age 14 years). The program was designed to reduce children’s risk of HIV infection and to improve their tolerance of and care for people with AIDS. Local teachers and health workers attended one-week training workshop before implementing the program over a 2 – 3 month period. The main results are that intervention pupils reported significantly higher scores for the following outcome measures than pupils attending the comparison schools: AIDS information (13.1% versus 10.5%; P = 0.0001), AIDS communication (10.9 versus 7.8; P = 0.001) AIDS knowledge (14.5 versus 11.5; P =0.0001), attitudes towards people with AIDS (9.0 versus 6.7; P = 0.0008), subjective norms (45.5 versus 43.9; P = 0.011), and intention (1.3
versus 1.4; \( P = 0.020 \)). No program effect was seen for attitudes towards sexual intercourse (47.0 versus 46.3; \( P = 0.44 \)). The results indicate that it is feasible and effective to provide AIDS education for Tanzanian primary school children (Klepp, et al., 1994).

A study was made in Pune, India. There is growing awareness that tribal peoples are sometimes at considerable risk for HIV as well as sexually-transmitted infections. Young people in such communities may be particularly vulnerable. Traditional practices may forbid discussion of sex and sexuality. A review was conducted of available data on the HIV epidemic within tribal groups. Based on findings, this review suggests a largely unexplored avenue for reaching tribal populations namely, the incorporation of the HIV and AIDS-related messages into traditional coming of age ceremonies. Such an intervention is especially effective to reach young people within these communities (Groce, et al., 2006).

A study was conducted in Accra, Ghana, with an aim to evaluate the relationship between family communications about HIV/AIDS and sexual activity and condom use among school-going adolescents. A sample of 894 students (56.9% girls, 43.1% boys; mean age = 17.4 years) at two senior secondary schools completed a modified version of the youth risk-behavior-survey questionnaire, a self-administered instrument developed by the centers for disease control and prevention. Results revealed that (25%) of the participants reported being sexually experienced, and (73.6%)
had talked about HIV/AIDS with parents or other family members. The findings of this study suggest that prevention programmes that seek to educate Ghanaian school-going adolescents about sexual risk behavior must strongly encourage communication about HIV/AIDS between students and family members (Adu-mireku, 2003).

A survey of knowledge, attitudes and risk estimates concerning HIV and AIDS in Zimbabwean students, a questionnaire-based survey was conducted on AIDS information to assess knowledge, attitudes and beliefs about AIDS and estimates of personal risk. It was completed by 238 students at the University of Zimbabwe. The results showed encouragingly high levels of knowledge concerning AIDS. Knowledge of transmission and characteristics was high, but knowledge of causes and prevention was more variable. Analysis of personal risk showed that AIDS was perceived as a serious threat, and the majority of respondents expressed concern about contracting AIDS. A significant correlation was found between knowledge and personal risk thought this only accounts for of 9% of the variance, indicating that knowledge by itself has limited impact upon risk estimates. Comparisons of gender, marital status differences, and differences in the amount of education received about AIDS, yielded few significant differences in total knowledge scores. The results are compared with findings from USA and Western Europe and suggestions are made for
the focus of future health education programmes in Zimbabwe (Pitts, et al., 1989).

A study was carried out in Tanzania with an aim to assess levels of AIDS knowledge, perceived risk of AIDS, attitudes towards sex and self-reported sexual behavior in primary schools children. Anonymous questionnaire data was collected from primary school children, from the fifth to seventh graders, in selected schools. A total of 711 students participated. The results indicated that knowledge of AIDS increased with increasing age. (96%) of the students reported that they were very afraid of getting AIDS. Children in high HIV/AIDS prevalence areas seem to have more knowledge about AIDS and also report lower levels of risk behavior than do primary school children in low prevalence areas (Ndeki, et al., 1994).
2. MATERIALS AND METHODS

2.1. The study design:

A prospective interventional study (pre and post) was conducted in Khartoum Locality among the secondary schools’ students second classes Khartoum State, with an aim to study the role of school health education in the promotion of the students’ knowledge, attitudes, and practices towards HIV infection, from June 2007 to March 2008.

2.2. Study area:

2.2.1. Location:

The study area (Khartoum Locality) is located in Khartoum State which is located almost in the centre of the Sudan between the Blue Nile and White Nile. Khartoum Locality consists of six administrative units: Khartoum East, Eshohada and Suba, Khartoum West, Khartoum, Khartoum middle and Elshgara (Locality Records, 2006).

2.2.2. Climate:

Since the area lies in Khartoum State (Metropolitan area) which is characterized by a semi-arid region of the tropical countries along longitude 15° – 36° North and latitude 32° – 33° East at an elevation of 380 meters above the sea level, with an annual rainfall of 160 mm, the weather is generally hot and dry. Summer season is characterized by higher temperature degree and drought. The temperature may reach up to 45°C. The average of relative humidity is about 31.5% (Locality Records, 2006).
2.2.3. Quality of buildings:

According to Khartoum Locality authority the buildings have distinct categories: 30% of buildings are first class (House size with an area of approximately 700 m\(^2\)), 70% of buildings are second and third classes (House size with an area of approximately 300 – 400 m\(^2\)), built from red bricks and cement and also from mud and green bricks in peripheral areas (Locality Records, 2006).

2.2.4. Water supply:

From Khartoum State Water Corporation, the main source of water supply is town water network. In peripheral areas there are artesian wells used as a source of water and distributed by water stations (KIOSKS) (Khartoum State Water Corporation, 2006).

2.2.5. Environmental sanitation:

2.2.5.1. Solid waste:

The system of solid waste collection is twice a week, house to house collection, besides storage in containers. Transportation and final sanitary disposal is in Jebal Toria (Locality Records, 2006).

2.2.5.2. Liquid waste:

Different systems are used for the disposal of liquid waste such as sewer systems in Khartoum Middle Administrative Unit and Khartoum except Tuti Island and Elbrari. In other administrative units the excreta disposal is by pit latrines and septic tanks (Locality Records, 2006).
2.2.6. **Educational services:**

There are adequate educational services including (186) secondary schools, (89) schools for boys and (95) schools for girls whereas (2) schools are mixed (Ministry of Education Records, 2006).

2.2.7. **School health services:**

Health authority in administrative units visits schools weekly and checks solid waste disposal, liquid waste and food hygiene besides health education in sanitation and communicable diseases (Health Authority in Khartoum Locality, 2006).

2.3. **The study population:**

The total population of Khartoum Locality is 745,938 persons. Most tribes of the Sudan are represented in the locality but most of them are from middle and Northern Sudan. Most of the people work as officials, sellers in the market, daily workers and other private works. The groups targeted by the study are the students in the secondary schools with a total number of 86787 students distributed in the governmental and non-governmental schools in Khartoum Locality (Locality Records, 2006).

2.4. **Sampling techniques:**

2.4.1. **Sample size:**

The target population is composed of six boys’ schools, and six girls’ schools, each was considered as a cluster. The sample size was determined using the proportion formula:
\[ n = \frac{D \sqrt{\frac{2 \hat{P}(1-\hat{P}) + Z_{1-\beta} \sqrt{P_1(1-P_1) + P_2(1-P_2)}}{(P_2 - P_1)^2}}}{\sqrt{(0.9)(0.55) + 1.282 \sqrt{(0.50)(0.5) + (0.4)(0.6)}}} \]

Where:

- \( n \): sample size.
- \( D \): design effect 2, at 95% level of significance.
- \( P_1 \): the estimated proportion at the time of the first survey = 0.50
- \( P_2 \): the target proportion = 0.40.

\[ \hat{p} = \frac{P_1 + P_2}{2} \]

\( Z_{1-\alpha} \) = the \( Z \)-score corresponding to the desired level of Significance = 1.645.

\( Z_{1-\beta} \) = the \( Z \)-score corresponding to the desired level of power = 1.282.

So when it was applied in the equation as below:

\[ n = \left( \frac{1.645 \sqrt{(0.9)(0.55) + 1.282 \sqrt{(0.50)(0.5) + (0.4)(0.6)}}}{(0.4 - 0.5)^2} \right)^2 = 844 \]

This resulted in a sample of 844 students distributed in intervention and comparison schools. Six schools were chosen for the intervention study groups and six schools were taken as control as below:

<table>
<thead>
<tr>
<th>Schools</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Study</td>
<td>Khartoum Elgadida 706 (102)</td>
<td>Mohamed Ali Makki 450(65)</td>
</tr>
<tr>
<td></td>
<td>Abo Obida Elgra 300 (44)</td>
<td>Elhomira 262 (40)</td>
</tr>
<tr>
<td></td>
<td>Wad Ageeb 450 (65)</td>
<td>El Khartoum Elgadida 760 (106)</td>
</tr>
<tr>
<td>2- Control</td>
<td>Buri 290 (58)</td>
<td>Halwiat Saad 495 (93)</td>
</tr>
<tr>
<td></td>
<td>Ali Alsid 317 (65)</td>
<td>Buri 280 (53)</td>
</tr>
<tr>
<td></td>
<td>El Sahafa 430 (88)</td>
<td>Arkaweet 350 (65)</td>
</tr>
</tbody>
</table>
2.4.2. Distribution of the sample size:

The sample was distributed proportionally over the intervention and comparison schools. The multi-stage cluster random sampling was used. The Locality of Khartoum consists of 6 administrative units, each one was considered as a cluster, using simple random sample two secondary schools selected from each administrative unit. The twelve secondary schools were divided randomly into two groups, six schools of the study (422), and another six for control (422), in the locality (844). From the schools the second classes were selected to participate in the study using the students’ lists.

2.5. Methods of data collection:

2.5.1. Questionnaire:

A modified WHO pre-coded questionnaire was designed and directed to the targets in order to respond to the questions posed by questionnaire information about the existing knowledge, attitudes and practices (KAPs) of the students towards HIV infection.

The same students were questioned before and after intervention in both study and control groups.

2.5.2. Interview:

The interview was meant for health professionals in Khartoum Ministry of Health, Sudan National AIDS Control Programme (SNAP), Ministry of Education, Secondary Schools Level Administration, and head
masters and head mistresses of schools under study to collect information about the study area and the study population.

Before the study commenced permission was obtained from the Federal ministries of Education and Health and from schools authorities.

2.6. Phases of the study:

The study was composed of three phases:

2.6.1. Phase One (Baseline data):

Data were collected from the intervention and control group i.e., a pre-intervention KAP survey was conducted, acting as base line data.

2.6.2. Phase two (Intervention phase):

In which health education materials were prepared by WHO, UNICEF and SNAP including the training manual of heath education in HIV infection control and pamphlets regarding HIV infection. Also the programme activities were implemented through one academic year.

The health education programme targets all the teachers’ committees in the study schools. The participative programme includes the following: a workshop for the teachers’ committees, a weekly lecture and group discussion for each class, two exhibitions at the beginning and at the end of the period, one role play in each school, continuous peer education by the students’ committee, with a weekly press by the students committees under researcher and trained teachers supervision getting benefit from the manual
and pamphlets. Such activities were carried out throughout one academic year, from June 2007 to March 2008.

The health message regarding HIV infection was communicated to the students using the above mentioned methods of communication.

The following contributed in the implementation of the intervention activities in the intervention schools, the researcher, secondary school students established, trained committees, trained teachers staff committees and the staff of SNAP in Khartoum State.

2.6.2.1. Training workshop:

A training workshop for teachers in the intervention schools including the selected groups participating in the implementation of the activities was held at the beginning of the academic year 2007/2008, where they were introduced to active teaching methods as well as being given some knowledge as regards HIV infection.

2.6.2.2. Training manual:

A training manual designed by WHO, UNICEF and SNAP was given to teachers and students so as to help them when participating in the implementation of the activities, and ensure correct health education messages regarding HIV infection during participation in the implementation of the health education activities.
2.6.2.3. Pamphlets:

Pamphlets were designed by SNAP containing different aspects of HIV infection including basic information and facts.

2.6.3. Phase three (Evaluation phase):

This is an evaluation phase in which data regarding the indicators of the study was collected using the same method of data collection used in phase one about the students’ (KAPs) as regards HIV infection. The same students in pre evaluation phase were questioned in the post-KAPs survey.

Then comparison process took place in both the intervention and comparison schools before and after the intervention period and then an internal comparison was carried out in the intervention schools before and after the intervention period.

2.7. Data analysis:

Data were analyzed by computer using Statistical Package for Social Sciences (SPSS), version 12. Figures and tables were drawn to depict the pattern of values. Cross-tabulations were used to compare interventional and control pre and post intervention. Chi–square test was used at 95% of confidence level (P≤ 0.05).
3. RESULTS

A prospective cohort intervention study was undertaken in Khartoum Locality to study the role of school health education in the promotion of the KAPs among secondary schools’ students regarding HIV infection. Complete data was obtained from a sample size of 422 students from the intervention group, 422 students from the comparison group and a total of 844 students from both intervention and comparison schools. The study showed the following findings explained in figures and tables:

Figure 1: The students’ distribution according to gender, Khartoum Locality 2011

50% of the students in the intervention and comparison schools were males.
Figure II: The distribution of the students according to age groups, Khartoum Locality 2011

<table>
<thead>
<tr>
<th>Age group (in years)</th>
<th>Intervention schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>12–13</td>
<td>8.1</td>
<td>15.6</td>
</tr>
<tr>
<td>14–15</td>
<td>74.4</td>
<td>57.1</td>
</tr>
<tr>
<td>16–17</td>
<td>13.5</td>
<td>22.3</td>
</tr>
<tr>
<td>&gt;17</td>
<td>4.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

74.4% of the students in the intervention schools were in the age group between 14 – 15 years compared to 57.1% in the comparison schools in the same age group.
Figure III: The students’ distribution according to region, Khartoum Locality 2011

76.8% of the students were from Northern Sudan in the intervention schools, compared to 65.6% in the comparison schools.
98.8% of the students were Muslims in the intervention schools, compared to 98.1% in the comparison schools.
Figure V: The students’ distribution according to marital status, Khartoum Locality 2011

99.8% of the students were single in the intervention schools compared to 99.5% in the comparison schools.
The educational level of 43.6% of the students’ fathers was secondary in the intervention schools, compared to 42.9% in the comparison schools.
41.5% of the students’ mothers’ educational level was secondary in the intervention schools, compared to 28.2% in the comparison schools.
72.7% of the students’ fathers’ occupations were private in the intervention schools, compared to 64.2% in the comparison schools.
Figure IX: The students’ distribution according to their families’ income/month, Khartoum Locality 2011

(n = 422)                   (n = 422)

The income of 32% of the students’ families is more than 500 SDG in intervention schools and 30.6% in the same range for the students’ families in the comparison schools.
Table 1: The students’ distribution according to their knowledge of the important diseases in the world, Khartoum Locality 2011

<table>
<thead>
<tr>
<th>Important disease in the World</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>AIDS “Yes”</td>
<td>192</td>
<td>45.5</td>
</tr>
<tr>
<td>AIDS “No”</td>
<td>102</td>
<td>24.2</td>
</tr>
<tr>
<td>Don’t know</td>
<td>128</td>
<td>30.3</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

$X^2 = 258$  $P. value = 0.000$  $X^2 = 0.0815$  $P. value = 0.665$

45.5% of the students in the intervention schools mentioned AIDS as an important disease in the world before the intervention. This increased to 95.7% after the intervention, which shows a highly significant positive change in their knowledge ($P. value = 0.000$). There was no significant change in the comparison schools from 48.9% at baseline to 51.9% at final survey.
Table 2: The students’ distribution according to their knowledge of the important diseases in the Sudan, Khartoum Locality 2011

<table>
<thead>
<tr>
<th>Important disease in the Sudan</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>AIDS “Yes”</td>
<td>171</td>
<td>405</td>
</tr>
<tr>
<td>AIDS “No”</td>
<td>110</td>
<td>10</td>
</tr>
<tr>
<td>Don’t know</td>
<td>141</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>422</td>
</tr>
</tbody>
</table>

X² = 299.7  P. value = 0.000  X² = 0.940  P. value = 0.625

40.5% of the students in the intervention schools mentioned AIDS as an important disease in the Sudan before the intervention. This increased to 96.0% after the intervention, which shows a highly significant positive change in their knowledge (P. value = 0.000). There was no significant change in the comparison schools from 46.7% at baseline to 43.4% at final survey.
Table 3: The students’ knowledge about the causative agent of AIDS, Khartoum Locality 2011

<table>
<thead>
<tr>
<th>Knowledge about causative agent of AIDS</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Virus “Yes”</td>
<td>174</td>
<td>41.2</td>
</tr>
<tr>
<td></td>
<td>190</td>
<td>45.0</td>
</tr>
<tr>
<td>Virus “No”</td>
<td>164</td>
<td>38.9</td>
</tr>
<tr>
<td></td>
<td>53</td>
<td>12.6</td>
</tr>
<tr>
<td>Don’t know</td>
<td>84</td>
<td>19.9</td>
</tr>
<tr>
<td></td>
<td>179</td>
<td>42.4</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

$X^2 = 320.1$  P. value = 0.000  $X^2 = 1.429$  P. value = 0.490

41.2% of the students in the intervention schools knew the causative agent of AIDS as a virus before the intervention. This increased to 97.9% after the intervention, which shows a highly significant positive change in their knowledge (P. value = 0.000). There was no significant change in the comparison schools from 43.8% at baseline to 45.0% at final survey.
Table 4: The knowledge among the students with respect to the symptoms of AIDS, Khartoum Locality 2011

<table>
<thead>
<tr>
<th>Signs and symptoms</th>
<th>Intervention Schools</th>
<th></th>
<th></th>
<th>Comparison Schools</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Know</td>
<td>0</td>
<td>0.0</td>
<td>363</td>
<td>86.0</td>
<td>11</td>
<td>2.6</td>
</tr>
<tr>
<td>Don’t know</td>
<td>422</td>
<td>100</td>
<td>59</td>
<td>14.0</td>
<td>411</td>
<td>97.4</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
<td>422</td>
<td>100</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

$X^2 = 636.9$  \hspace{1cm} P. value = 0.000  \hspace{1cm} $X^2 = 0.172$  \hspace{1cm} P. value = 0.679

No student in the intervention schools knew about the symptoms of AIDS before the intervention. This increased to 86.0% after the intervention, which shows a highly significant positive change in their knowledge (P. value = 0.000). There was no significant change in the comparison schools from 2.6% at baseline to 3.1% at final survey.
Table 5: HIV carriers may appear healthy without symptoms of AIDS according to the students’ knowledge, Khartoum Locality 2011

<table>
<thead>
<tr>
<th>HIV carriers Appear without symptoms</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>113</td>
<td>26.8</td>
</tr>
<tr>
<td>No</td>
<td>41</td>
<td>9.7</td>
</tr>
<tr>
<td>Don’t know</td>
<td>268</td>
<td>63.5</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

$X^2 = 425.2 \quad P. value = 0.000 \quad X^2 = 0.483 \quad P. value = 0.786$

26.8% of the students in the intervention schools knew that HIV carriers may appear healthy without showing symptoms of AIDS before the intervention. This increased to 94.0% after the intervention, the difference is a highly significant positive change in their knowledge ($P. value = 0.000$). There was no significant change in the comparison schools from 28.0% to 28.2%.
36.7% of the students in the intervention schools heard about AIDS patients before the intervention. This increased to 65.9% after the intervention, which is a significant positive change in their knowledge (P. value = 0.000). There was no significant change in the comparison schools from 41.7% to 37.4%.
Table 7: The knowledge among the students regarding AIDS modes of transmission, Khartoum Locality 2011

<table>
<thead>
<tr>
<th>AIDS modes of transmission</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Know</td>
<td>174</td>
<td>41.2</td>
</tr>
<tr>
<td>Don’t know</td>
<td>248</td>
<td>58.8</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

X² = 351.1 P. value = 0.000 X² = 1.66 P. value = 0.197

41.2% of the students in the intervention schools mentioned the modes of transmission of AIDS before the intervention. This increased to 100.0% after the intervention, which is a highly significant positive change in their knowledge (P. value = 0.000). There was no significant change in the comparison schools from 31.0% at baseline to 27.0% at final survey.
Table 8: The students’ knowledge of the possibility of HIV carriers to transmit the disease, Khartoum Locality 2011

<table>
<thead>
<tr>
<th>The possibility of HIV carriers for transmitting the disease</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>Yes</td>
<td>131</td>
<td>31.0</td>
</tr>
<tr>
<td>No</td>
<td>164</td>
<td>38.9</td>
</tr>
<tr>
<td>Don’t know</td>
<td>127</td>
<td>30.1</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

\[X^2 = 379.0\] \[P. value = 0.000\] \[X^2 = 5.373\] \[P. value = 0.068\]

31.0% of the students in the intervention schools knew about the possibility of HIV carriers to transmit the disease. This increased to 95.5% after the intervention, which shows a highly significant positive change in their knowledge (P. value = 0.000). There was no significant change in the comparison schools from 37.0% to 38.2%.
Table 9: The students’ knowledge of transmitting HIV via shaking hands with HIV carriers, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>HIV via shaking hands with HIV carriers</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>88</td>
<td>20.9</td>
</tr>
<tr>
<td>No</td>
<td>153</td>
<td>36.3</td>
</tr>
<tr>
<td>Don’t know</td>
<td>181</td>
<td>42.8</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

\[X^2 = 367.8 \quad \text{P. value} = 0.000\] \[X^2 = 0.095 \quad \text{P. value} = 0.954\]

36.3% of the students in the intervention schools knew that shaking hands with HIV carriers can not transmit HIV before the intervention. This increased to 98.1% after the intervention, which shows a highly significant positive change in their knowledge (P. value = 0.000). There was no significant change in the comparison schools from 37.0% to 37.4%.
Table 10: The student's knowledge of transmitting HIV through eating and drinking with HIV carriers, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>HIV through eating and drinking</th>
<th>Intervention Schools</th>
<th></th>
<th>Comparison Schools</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>157</td>
<td>37.2</td>
<td>12</td>
<td>2.8</td>
<td>165</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>135</td>
<td>32.0</td>
<td>410</td>
<td>97.2</td>
<td>114</td>
</tr>
<tr>
<td>Don’t know</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>130</td>
<td>30.8</td>
<td>0</td>
<td>0.0</td>
<td>143</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

\[ X^2 = 393.1 \quad \text{P. value} = 0.000 \quad X^2 = 0.130 \quad \text{P. value} = 0.937 \]

32.0% of the students in the intervention schools knew that eating and drinking with HIV carriers can not transmit HIV before the intervention. This increased to 97.2% after the intervention, which shows a highly significant positive change in their knowledge (P. value = 0.000). There was no significant change in the comparison schools from 27.0% at baseline to 27.7%.
Table 11: The students’ knowledge of transmitting HIV by injection needles or syringes used by HIV carriers, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>HIV by injection needles or syringes</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>259</td>
<td>61.4</td>
</tr>
<tr>
<td>No</td>
<td>56</td>
<td>13.2</td>
</tr>
<tr>
<td>Don’t know</td>
<td>107</td>
<td>25.4</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

\[X^2 = 173.9 \quad P. \text{ value} = 0.000 \quad X^2 = 1.054 \quad P. \text{ value} = 0.591\]

61.4% of the students in the intervention schools knew that injection needles or syringes used by HIV carriers can transmit HIV before the intervention. This increased to 97.6% after the intervention, which shows a highly significant positive change in their knowledge (P. value = 0.000). There was no significant change in the comparison schools from 57.4% at baseline to 54.8%.
Table 12: The students’ knowledge of transmitting HIV by deep prolonged kissing with HIV carriers, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>HIV by deep prolonged kissing</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>133</td>
<td>31.5</td>
</tr>
<tr>
<td>No</td>
<td>63</td>
<td>14.9</td>
</tr>
<tr>
<td>Don’t know</td>
<td>226</td>
<td>53.6</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

X² = 265  P. value = 0.000  X² = 0.219  P. value = 0.896

31.5% of the students in the intervention schools knew that deep prolonged kissing with HIV carriers can transmit HIV before the intervention. This increased to 75.4% after the intervention, which shows significant positive change in their knowledge (P. value = 0.000). There was no significant change in the comparison schools from 31.3% to 32.5%.
Table 13: The students’ knowledge of transmitting HIV by involving in unprotected sex with prostitutes, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>HIV by unprotected sex with prostitutes</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>194</td>
<td>46.0</td>
</tr>
<tr>
<td>No</td>
<td>64</td>
<td>15.2</td>
</tr>
<tr>
<td>Don’t know</td>
<td>164</td>
<td>38.8</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

\[X^2 = 257.8 \quad \text{P. value} = 0.000 \quad X^2 = 1.082 \quad \text{P. value} = 0.582\]

46% of the students in the intervention schools knew that involving in unprotected sex with prostitutes can transmit HIV before the intervention. This increased to 96% after the intervention, which shows a highly significant positive change in their knowledge (P. value = 0.000). There was no significant change in the comparison schools from 48.6% at baseline to 50.0%.
Table 14: The students’ knowledge of transmitting HIV by involving in unprotected sex with multi-partners, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>HIV by unprotected sex with multi-partners</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Yes</td>
<td>211</td>
<td>50.0</td>
</tr>
<tr>
<td>No</td>
<td>26</td>
<td>6.2</td>
</tr>
<tr>
<td>Don’t know</td>
<td>185</td>
<td>43.8</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

X² = 256  P. value = 0.000  X² = 0.463  P. value = 0.793

50.0% of the students in the intervention schools knew that involving in unprotected sex with multi-partners can transmit HIV before the intervention. This increased to 97.9% after the intervention, which shows a highly significant positive change in their knowledge (P. value = 0.000). There was no significant change in the comparison schools from 53.8% to 55.7%.
Table 15: The students’ knowledge of transmitting HIV by mosquito bites, Khartoum Locality 2011.

30.3% of the students in the intervention schools knew that mosquito bites can not transmit HIV before the intervention. This increased to 95.5% after the intervention, which shows a highly significant positive change in their knowledge (P. value = 0.000). There was no significant change in the comparison schools from 23.2% to 22.3%.

<table>
<thead>
<tr>
<th>HIV by mosquito bites</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>113</td>
<td>26.8</td>
</tr>
<tr>
<td>No</td>
<td>128</td>
<td>30.3</td>
</tr>
<tr>
<td>Don’t know</td>
<td>181</td>
<td>42.9</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

X² = 389.3  P. value = 0.000  X² = 0.394  P. value = 0.821
Table 16: The students’ knowledge of transmitting HIV by blood transfusion from infected persons, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>HIV by blood transfusion from infected persons</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>223</td>
<td>52.8</td>
</tr>
<tr>
<td>No</td>
<td>19</td>
<td>4.5</td>
</tr>
<tr>
<td>Don’t know</td>
<td>180</td>
<td>42.7</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

52.8% of the students in the intervention schools knew that blood transfusion from infected persons can transmit HIV before the intervention. This increased to 97.9% after the intervention, which shows a highly significant positive change in their knowledge (P. value = 0.000). There was no significant change in the comparison schools from 53.6% at baseline to 56.2% at final survey.
Table 17: The students’ knowledge of transmitting HIV by involving in unprotected sex with homosexuals, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>HIV by unprotected sex with homosexuals</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>172</td>
<td>40.8</td>
</tr>
<tr>
<td>No</td>
<td>20</td>
<td>4.7</td>
</tr>
<tr>
<td>Don’t know</td>
<td>230</td>
<td>54.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

\[X^2 = 319 \quad \text{P. value} = 0.000 \quad X^2 = 0.740 \quad \text{P. value} = 0.691\]

40.8% of the students in the intervention schools knew that involving in unprotected sex with homosexuals can transmit HIV before the intervention. This increased to 97.2% after the intervention, which shows a highly significant positive change in their knowledge (P. value = 0.000). There was no significant change in the comparison schools, from 46.7% at baseline to 47.2% at final survey.
Table 18: The students’ knowledge of transmitting HIV from infected pregnant woman to her infant, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>HIV from infected pregnant woman to her infant</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>175</td>
<td>41.5</td>
</tr>
<tr>
<td>No</td>
<td>12</td>
<td>2.8</td>
</tr>
<tr>
<td>Don’t know</td>
<td>235</td>
<td>55.7</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

X² = 330.8  P. value = 0.000  X² = 4.419  P. value = 0.110

41.5% of the students in the intervention schools knew that infected pregnant woman can transmit HIV to her infant before the intervention. This increased to 97.6% after the intervention, which shows a highly significant positive change in their knowledge (P. value = 0.000). There was no significant change in the comparison schools from 46.4% at baseline to 44.1% at final survey.
Table 19: The students’ knowledge of AIDS long incubation period, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>Knowledge of AIDS long incubation period</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>98</td>
<td>23.2</td>
</tr>
<tr>
<td>No</td>
<td>56</td>
<td>13.3</td>
</tr>
<tr>
<td>Don’t know</td>
<td>268</td>
<td>63.5</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

X² = 412.6  P. value = 0.000  X² = 0.619  P. value = 0.734

23.2% of the students in the intervention schools knew that AIDS has long incubation period before the intervention. This increased to 89.3% after the intervention which shows a highly significant positive change in their knowledge (P. value = 0.000). There was no significant change in the comparison schools from 14.9% to 16.8%.
Table 20: The students’ knowledge that persons suffering from STDs are more susceptible to HIV transmission during sexual intercourse, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>Persons suffering from STDs are more susceptible to HIV</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>103</td>
<td>24.4</td>
</tr>
<tr>
<td>No</td>
<td>29</td>
<td>6.9</td>
</tr>
<tr>
<td>Don’t know</td>
<td>290</td>
<td>68.7</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

X² = 459  P. value = 0.000  X² = 0.543  P. value = 0.762

24.4% of the students in the intervention schools knew that persons suffering from STDs are more susceptible to HIV transmission during sexual intercourse before the intervention. This increased to 95.3% after the intervention, which shows a highly significant positive change in their knowledge (P. value = 0.000). There was no significant change in the comparison schools from 30.1% to 30.8%.
Table 21: The students’ knowledge that AIDS patient can restore his immuno-system, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>AIDS patient can restore his immuno-system</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>100</td>
<td>23.7</td>
</tr>
<tr>
<td>No</td>
<td>122</td>
<td>28.9</td>
</tr>
<tr>
<td>Don’t know</td>
<td>200</td>
<td>47.4</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

\[X^2 = 403.6 \quad \text{P. value} = 0.000 \quad X^2 = 0.006 \quad \text{P. value} = 0.997\]

28.9% of the students in the intervention schools knew that AIDS patient can not restore his immuno-system before the intervention. This increased to 95.7% after the intervention, which shows a highly significant positive change in their knowledge (P. value = 0.000). There was no significant change in the comparison schools from 22.7% at baseline to 22.7% at final survey.
Table 22: The students’ knowledge that AIDS patient can be cured, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>AIDS patient can be cured</th>
<th>Intervention Schools</th>
<th></th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Yes</td>
<td>83</td>
<td>19.7</td>
<td>25</td>
</tr>
<tr>
<td>No</td>
<td>144</td>
<td>34.1</td>
<td>393</td>
</tr>
<tr>
<td>Don’t know</td>
<td>195</td>
<td>46.2</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
<td>422</td>
</tr>
</tbody>
</table>

$X^2 = 329.9$  \hspace{1cm} P. value = 0.000  \hspace{1cm} X^2 = 0.215  \hspace{1cm} P. value = 0.898

34.1% of the students in the intervention schools knew that AIDS patient can not be cured before the intervention. This increased to 93.1% after the intervention, which shows a highly significant positive change in their knowledge (P. value = 0.000). There was no significant change in the comparison schools from 28.2% at baseline to 26.8%.
Table 23: The knowledge among the students with respect to the people at risk of acquiring HIV, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>People at risk of acquiring HIV</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>People having STDs</td>
<td>27</td>
<td>6.4</td>
<td>1</td>
</tr>
<tr>
<td>Infants to mothers with HIV</td>
<td>37</td>
<td>8.8</td>
<td>5</td>
</tr>
<tr>
<td>People have multi-sexual partners</td>
<td>101</td>
<td>23.9</td>
<td>6</td>
</tr>
<tr>
<td>Intravenous drug users</td>
<td>67</td>
<td>15.9</td>
<td>0</td>
</tr>
<tr>
<td>Answer 1 &amp; 3</td>
<td>48</td>
<td>11.4</td>
<td>13</td>
</tr>
<tr>
<td>All mentioned</td>
<td>142</td>
<td>33.6</td>
<td>397</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>422</strong></td>
<td><strong>100</strong></td>
<td><strong>422</strong></td>
</tr>
</tbody>
</table>

\[ X^2 = 340.5 \quad \text{P. value} = 0.000 \quad X^2 = 6.945 \quad \text{P. value} = 0.225 \]

All mentioned was identified by 33.6% of the students before the intervention. This increased to 94.1% after the intervention, which is a highly significant positive change in their knowledge (P. value = 0.000). There was no significant change in the comparison schools from 28.2% to 32.7%.
Table 24: The students’ knowledge of the methods of protection from HIV infection, Khartoum Locality 2011.

| Method of protection from HIV infection | Intervention Schools | | | | | | Comparison Schools | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pre | Post | Pre | Post | Pre | Post | Pre | Post | Pre | Post | Pre | Post |
| Stick to one partner | 17 | 4.0 | 2 | 0.5 | 19 | 4.5 | 20 | 4.7 |
| Using condom | 27 | 6.4 | 11 | 2.6 | 50 | 11.8 | 49 | 11.6 |
| Avoid illegal sex | 149 | 35.3 | 19 | 4.5 | 131 | 31.1 | 128 | 30.4 |
| Sterilization equipment | 52 | 12.4 | 4 | 0.9 | 52 | 12.3 | 54 | 12.8 |
| All mentioned | 177 | 41.9 | 386 | 91.5 | 170 | 40.3 | 171 | 40.5 |
| Total | 422 | 100 | 422 | 100 | 422 | 100 | 422 | 100 |

X² = 237.9  P. value = 0.000  X² = 0.111  P. value = 0.999

All mentioned was identified by 41.9% of the students before the intervention. This increased to 91.5% after the intervention, which shows a highly significant positive change in their knowledge (P. value = 0.000). No significant change was registered among the comparison groups from 40.3% to 40.5%.
Table 25: The students’ knowledge of the effective method in preventing the HIV infection, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>Effective method in preventing HIV infection</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>112</td>
<td>26.5</td>
</tr>
<tr>
<td>Immuno-drugs</td>
<td>106</td>
<td>25.2</td>
</tr>
<tr>
<td>Traditional treatment</td>
<td>46</td>
<td>10.9</td>
</tr>
<tr>
<td>Changing risk behaviours</td>
<td>139</td>
<td>32.9</td>
</tr>
<tr>
<td>Others</td>
<td>19</td>
<td>4.5</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

X² = 325.9  P. value = 0.000  X² = 6.378  P. value = 0.173

32.9% of the students in the intervention schools knew that the effective method in preventing HIV infection is changing personal risk behaviours before the intervention. This increased to 92.7% after the intervention, which shows a highly significant positive change (P. value = 0.000). There was no significant change in the comparison schools from 41.5% to 42.4%.
Table 26: The students’ attitude towards people living with HIV is that they should be isolated from their families and community, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>People living with HIV should be isolated</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Agree</td>
<td>278</td>
<td>65.9</td>
</tr>
<tr>
<td>Disagree</td>
<td>56</td>
<td>13.2</td>
</tr>
<tr>
<td>Don’t know</td>
<td>88</td>
<td>20.9</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

$X^2 = 377.3$  \hspace{1cm} P. value = 0.000  \hspace{1cm} $X^2 = 0.120$  \hspace{1cm} P. value = 0.942

13.2% of the students in the intervention schools disagreed with isolating people living with HIV from their families and community before the intervention. This increased to 79.6% after the intervention, the difference was statistically significant result (P. value = 0.000). There was no significant change in the comparison schools from 12.3% at baseline to 13.0% at final survey.
Table 27: The students’ attitude towards people living with HIV is that they should be permitted to work in restaurants, Khartoum Locality 2011.

21.1% of the students in the intervention schools agreed with permitting people living with HIV to work in restaurants before the intervention. This increased to 87.9% after the intervention, which is highly significant result (P. value = 0.000). There was no significant change in the comparison schools from 15.4% at baseline to 20.9%.

<table>
<thead>
<tr>
<th>People living with HIV should be permitted</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Agree</td>
<td>89</td>
<td>21.1%</td>
</tr>
<tr>
<td>Disagree</td>
<td>248</td>
<td>58.8%</td>
</tr>
<tr>
<td>Don’t know</td>
<td>85</td>
<td>20.1%</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100%</td>
</tr>
</tbody>
</table>

X² = 382.7    P. value = 0.000    X² = 4.250    P. value = 0.119
Table 28: The students’ attitude of preventing the disease through not using contaminated needles among drug abusers, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>Prevention AIDS among drug abusers</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Agree</td>
<td>86</td>
<td>20.4</td>
</tr>
<tr>
<td>Disagree</td>
<td>67</td>
<td>15.9</td>
</tr>
<tr>
<td>Don’t know</td>
<td>269</td>
<td>63.7</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

χ² = 293.4  P. value = 0.000  χ² = 1.671  P. value = 0.434

20.4% of the students in the intervention schools agreed with preventing the disease through not using contaminated needles among drug abusers before the intervention. This increased to 60.7% after the intervention, which is a significant result (P. value = 0.000). There was no significant change in the comparison schools from 26.8% to 30.8%.
Table 29: The students’ attitude towards wearing HIV carrier’s clothes, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>Wearing HIV carrier’s clothes</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Agree</td>
<td>165</td>
<td>39.1</td>
</tr>
<tr>
<td>Disagree</td>
<td>121</td>
<td>28.7</td>
</tr>
<tr>
<td>Don’t know</td>
<td>136</td>
<td>32.2</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

X² = 412.1 P. value = 0.000 X² = 1.569 P. value = 0.456

28.7% of the students in the intervention schools disagreed with wearing the HIV carrier’s clothes before the intervention. This increased to 96.2% after the intervention, which shows highly significant result (P. value = 0.000). There was no significant change in the comparison schools from 26.3% at baseline to 26.1% at final survey.
Table 30: Discussing the topic of AIDS disease with their colleagues or neighbours according to the students, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>Discussed the topic of AIDS with colleagues</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>No</td>
<td>219</td>
<td>51.9</td>
</tr>
<tr>
<td>1 or 2</td>
<td>58</td>
<td>13.7</td>
</tr>
<tr>
<td>More than 3</td>
<td>72</td>
<td>17.1</td>
</tr>
<tr>
<td>Don’t know</td>
<td>73</td>
<td>17.3</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

X² = 314.4  P. value = 0.000  X² = 1.926  P. value = 0.588

17.1% of the students in the intervention schools discussed the AIDS topic with their colleagues and neighbours more than 3 times before the intervention. This increased to 67.8% after the intervention, which is significant result (P. value = 0.000). There was no significant change in the comparison schools from 17.5% at baseline to 19.2% at final survey.
Table 31: The prevention of HIV infection is possible by changing personal risk behaviours according to the student's knowledge, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>Prevention of HIV infection is possible by changing personal risk behaviours</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>Yes</td>
<td>175</td>
<td>41.5</td>
</tr>
<tr>
<td>No</td>
<td>32</td>
<td>7.6</td>
</tr>
<tr>
<td>Don’t know</td>
<td>215</td>
<td>50.9</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

X² = 301        P. value = 0.000  X² = 0.021        P. value = 0.990

41.5% of the students in the intervention schools knew that the prevention of HIV infection is possible by changing personal risk behaviours before the intervention. This increased to 95% after the intervention, which is a highly significant positive change in their knowledge (P. value = 0.000). There was no significant change in the comparison schools from 40.8% at baseline to 41.2% at final survey.
Table 32: The effective methods of preventing HIV infection as mentioned by the students, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>Effective methods of preventing HIV infection</th>
<th>Intervention Schools</th>
<th></th>
<th></th>
<th>Competition Schools</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>Know</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>1.4</td>
<td>392</td>
<td>92.9</td>
<td>51</td>
<td>12.1</td>
</tr>
<tr>
<td>Don’t know</td>
<td>416</td>
<td>98.6</td>
<td>30</td>
<td>7.1</td>
<td>371</td>
<td>87.9</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
<td>422</td>
<td>100</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

$X^2 = 708.4$  P. value = 0.000  $X^2 = 1.029$  P. value = 0.310

1.4% of the students in the intervention schools knew the effective methods of preventing HIV infection before the intervention. This increased to 92.9% after the intervention, which shows a highly significant positive change in their knowledge (P. value = 0.000). There was no significant change in comparison schools from 12.1% to 14.5%.
Table 33: Changing the friends’ behaviours or life styles after hearing and learning about AIDS according to Student's friends, Khartoum Locality 2011.

18.0% of the students’ friends in the intervention schools changed their behaviours or life styles after hearing and learning about AIDS before the intervention. This increased to 65.2% after the intervention, which shows a significant result (P. value = 0.000). There was no significant in the comparison schools from 13.5% at baseline to 12.3%.
Table 34: The students’ willingness to change their behaviours or life styles after hearing and learning about AIDS, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>Students’ willingness to change their behaviours or life styles</th>
<th>Intervention Schools</th>
<th></th>
<th>Comparison Schools</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.  %</td>
<td>No.  %</td>
<td>No.  %</td>
<td>No.  %</td>
</tr>
<tr>
<td>Yes</td>
<td>192  45.5</td>
<td>390  92.4</td>
<td>183  43.4</td>
<td>173  41.0</td>
</tr>
<tr>
<td>No</td>
<td>32  7.6</td>
<td>23  5.5</td>
<td>53  12.6</td>
<td>76  18.0</td>
</tr>
<tr>
<td>Don’t know</td>
<td>198  46.9</td>
<td>9   2.1</td>
<td>186  44.0</td>
<td>173  41.0</td>
</tr>
<tr>
<td>Total</td>
<td><strong>422  100</strong></td>
<td><strong>422  100</strong></td>
<td><strong>422  100</strong></td>
<td><strong>422  100</strong></td>
</tr>
</tbody>
</table>

\[ X^2 = 241.3 \quad P.\ value = 0.000 \quad X^2 = 4.852 \quad P.\ value = 0.088 \]

45.5% of the students in the intervention schools are willing to change their behaviours or life styles after hearing and learning about AIDS before the intervention. This increased to 92.4% after the intervention, which shows a highly significant result (P. value = 0.000). There was no significant in the comparison schools from 43.4% to 41.0%. 
Table 35: The students changed their behaviours or life styles after hearing and learning about AIDS, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>Students changed their behaviours or life styles</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>161</td>
<td>38.2</td>
</tr>
<tr>
<td>No</td>
<td>60</td>
<td>14.2</td>
</tr>
<tr>
<td>Don’t know</td>
<td>201</td>
<td>47.6</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

\[X^2 = 256.3 \quad \text{P. value} = 0.000 \quad X^2 = 0.156 \quad \text{P. value} = 0.925\]

38.2% of the students in the intervention schools changed their behaviours and life styles after hearing and learning about AIDS before the intervention. This increased to 87.2% after the intervention, which shows a highly significant result (P. value = 0.000). There was no significant change in the comparison schools from 37.0% at baseline to 36.3% at final survey.
Table 36: The changes in behaviours after hearing and learning about AIDS among the students, Khartoum Locality 2011.

1.2% of the students in the intervention schools made positive changes in their behaviours after hearing and learning about AIDS before the intervention. This increased to 90.8% after the intervention, which shows a highly significant result (P. value = 0.000). There was no significant change in the comparison schools from 4.3% at baseline to 7.1% at final survey.
Table 37: Students’ attitudes towards the termination of friendships after knowing their friend is an HIV carrier according to the students, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>Termination of friendship after knowing their friend is an HIV carrier</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>222</td>
<td>52.6</td>
</tr>
<tr>
<td>No</td>
<td>200</td>
<td>47.4</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

\[X^2 = 135.8 \quad \text{P. value} = 0.000 \quad X^2 = 0.005 \quad \text{P. value} = 0.944\]

47.4% of the students in the intervention schools did not terminate the friendship after knowing their friend is an HIV carrier before the intervention. This increased to 85.3% after the intervention, which shows a significant result (P. value = 0.000). There was no significant change in the comparison Schools from 38.6% to 38.9%.
Table 38: Discussing the topic of AIDS frankly with their friends according to the students, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>Discussed the topic of AIDS frankly with friends</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>119</td>
<td>28.2</td>
</tr>
<tr>
<td>No</td>
<td>303</td>
<td>71.8</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

\[ X^2 = 222.3 \quad \text{P. value} = 0.000 \quad X^2 = 1.961 \quad \text{P. value} = 0.161 \]

28.2% of the students in the intervention schools discussed frankly the topic of AIDS with their friends before the intervention. This increased to 79.4% after the intervention, which is a highly significant result (P. value= 0.000). There was no significant change in the comparison schools from 18.0% to 14.5%.
### Table 39: Discussing the topic of AIDS frankly with their families according to the students, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>Discussed the topic of AIDS frankly with families</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.  %</td>
<td>No.  %</td>
</tr>
<tr>
<td>Yes</td>
<td>116  27.5%</td>
<td>251  59.5%</td>
</tr>
<tr>
<td>No</td>
<td>306  72.5%</td>
<td>171  40.5%</td>
</tr>
<tr>
<td>Total</td>
<td>422  100%</td>
<td>422  100%</td>
</tr>
</tbody>
</table>

\[X^2 = 87.8\quad \text{P. value} = 0.000\quad X^2 = 0.702\quad \text{P. value} = 0.402\]

27.5% of the students in the intervention schools discussed frankly the topic of AIDS with their families before the intervention. This increased to 59.5% after the intervention, which is a highly significant result (P. value = 0.000). There was no significant change in the comparison school from 11.4% at baseline to 13.3% at final survey.
<table>
<thead>
<tr>
<th>Attitude towards doing HIV test</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Agree</td>
<td>215</td>
<td>50.9</td>
</tr>
<tr>
<td>Disagree</td>
<td>67</td>
<td>15.9</td>
</tr>
<tr>
<td>Don’t know</td>
<td>140</td>
<td>33.2</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

50.9% of the students in the intervention schools agreed to do an HIV test before the intervention. This increased to 88.9% after the intervention, which shows a highly significant result (P. value = 0.000). There was no significant change in the comparison schools from 42.9% to 41.7%.
Table 41: The role of the students in controlling HIV infection, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>The role of the students in controlling HIV infection</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>182</td>
<td>43.1</td>
</tr>
<tr>
<td>No</td>
<td>52</td>
<td>12.3</td>
</tr>
<tr>
<td>Do not know</td>
<td>188</td>
<td>44.6</td>
</tr>
<tr>
<td>Total</td>
<td>422</td>
<td>100</td>
</tr>
</tbody>
</table>

\[X^2 = 287.9\] \hspace{1cm} \text{P. value} = 0.000 \hspace{1cm} \[X^2 = 1.635\] \hspace{1cm} \text{P. value} = 0.442

43.1% of the students in the intervention schools knew their role in controlling AIDS before the intervention. This increased to 96.7% after the intervention, which shows a highly significant result (\(P.\ value = 0.000\)). There was no significant change in the comparison schools from 44.0% to 43.8%.
Table 42: Students’ beliefs of the role of religion in protection against HIV infection, Khartoum Locality 2011.

<table>
<thead>
<tr>
<th>Religion has a role in protection against HIV infection</th>
<th>Intervention Schools</th>
<th>Comparison Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td></td>
<td>No.  %</td>
<td>No.  %</td>
</tr>
<tr>
<td>Yes</td>
<td>380  90.0</td>
<td>406  96.2</td>
</tr>
<tr>
<td>No</td>
<td>42   10.0</td>
<td>16   3.8</td>
</tr>
<tr>
<td>Total</td>
<td>422  100</td>
<td>422  100</td>
</tr>
</tbody>
</table>

X² = 12.51  P. value = 0.000  X² = 1.652  P. value = 0.199

90% of the students in the intervention schools believed in role of religion in protection against HIV infection before the intervention. This increased to 96.2% after the intervention, which is a highly significant result (P. value = 0.000). There was no significant change in the comparison schools from 89.1% at baseline to 91.7% at final survey.
4.1. DISCUSSION

This study indicates the potential benefits and the role of school health education administered to the secondary schools’ students in Khartoum Locality, as shown in the following discussion:

The results showed that most of the students in the intervention and comparison schools (87.9%), and (79.4%) were in the age group between 14-17 years old. At this age the secondary schools’ students, the target group; were exposed today to new risks to health, they may be infected by HIV incidentally without knowing the mode of transmission or control measures. This complied with what was stated by SNAP, 2009 that the younger and middle-age group in Sudan were the mostly affected with HIV infection (88.5%). Also Nakajima, 1992 mentioned that teenagers need to be targeted for health education programmes. This is due to the fact that most negative or positive behavioral patterns are consolidated during adolescence, and that effective health education programme make an important difference not only in knowledge, but also in attitudes and behaviors that result in a healthy life style.

Also WHO, 2006 mentioned that AIDS leads to frustrations and despair and kills young and middle-aged adults who are the mainstay of the family, the backbone of the work force and the key to development.
Also UNAIDS, WHO, 2009 reported that young people are a big majority who are infected with HIV/AIDS (2.1) million children under 15 years become infected by 2008.

Most of the students’ fathers’ education level was poor, ranging between Khalwa and secondary in both intervention and comparison schools: (67.3%), (65.3%) and for mothers of the students as (76.8%), (72.7%) in both intervention, and comparison schools. This would definitely affect different aspects of knowledge, attitudes and practices. This was similar to that mentioned by Gary, et al., 1989 who mentioned that identifying the characteristics of those who have not heard about AIDS is a first step in reaching those who are not being informed through standard education programmes and media coverage. Also, this complied with a study carried out by Akwir, et al., 1996 in Northern Uganda showed that trained women have become very active in AIDS prevention education programme.

The majority of the students (95.7%) mentioned AIDS is an important disease in the world after the intervention in the intervention schools, as compared to (45.5%) before the intervention. This is found to be significant (P. value = 0.000). But there was no significant change in the comparison schools from (48.8%) at baseline to (51.9%) at final survey. The variation in the study schools and comparison schools indicated the effectiveness of the intervention. This increase in knowledge complied with
UNAIDS, WHO, 2006 which stated that 33.4 million people in different locations in the world became infected with HIV by the end of 2008. Also, WHO, 2000 mentioned that AIDS is a major public health problem in the world, since the AIDS epidemic was first identified in 1981, it has spread throughout the world.

The majority of the students (96.0%) mentioned AIDS as an important disease in the Sudan after the intervention in the intervention schools, as compared to (40.5%) before the intervention. This is found to be significant (P. value = 0.000). But there was no significant change in the comparison schools from (46.7%) at baseline to (43.4%) at final survey. This increase in knowledge was complied with SNAP 2009 which mentioned that AIDS is becoming one of the major health concerns in Sudan, the prevalence rate in the Sudan is being (1.6%) which proves that the disease is increasing.

Also WHO, 2006 mentioned that AIDS is a serious disease that has no vaccine, treatment or cure for the time being.

Also SNAP, 2006 mentioned that the factors behind the HIV/AIDS epidemic in the Sudan were identified as war and the resulting population movement (displacement, refugees, and military personnel), the wide open borders with nine African countries, the economic crisis in the country, urbanization and lack of awareness.
The majority of the students (97.9%) knew the virus as a causative agent of AIDS after the intervention, as compared to (41.2%) before the intervention. This was found to be significant (P. value = 0.000). But there was no significant change in the comparison schools from (43.8%) to (45.0%). This was similar to that mentioned by Klepp, et al., 1994 in a study about health education with regard to AIDS, carried out in Arusha and Kilimanjaro regions, Tanzania, in order to test the effects of an AIDS education programme in primary schools children. It was reported that there were significantly high scores for AIDS information (13.1 versus 10.5; P = 0.0001).

Also, a study was carried out in Byumba in Rwanda by Uhagaze, et al., 1999 to study the knowledge, attitudes and practices among students at schools. The results showed that students who had participated in an AIDS club scored significantly higher in the knowledge part (P = 0.01).

Before the intervention, no student knew the signs and symptoms of AIDS but after the intervention the percentage increased to (86.0%) among the students in the intervention schools. This was found to be significant (P. value = 0.000). No significant changes were reported in knowledge among the students in the comparison schools from (2.6%) at baseline to (3.1%) at final survey. The results were similar to the findings of a study carried out by Elzubier, et al., 1996 in Kassala, eastern Sudan, who mentioned that the
secondary schools’ students scored high knowledge about AIDS-related knowledge and misconceptions.

Also, a study was conducted in Tanzania by Ndeki, *et al.*, 1994 with the aim of assessing the levels of AIDS knowledge and perceived risk of AIDS. Anonymous questionnaire data was collected from primary school children, a total of 711 students participated. The results indicated that knowledge of AIDS increased with increasing age. Children in high HIV/AIDS prevalence areas seem to have more knowledge about AIDS than primary school children in low prevalence areas.

A significant increase in knowledge about the modes of transmission of AIDS disease (P. value = 0.000) among the students in the intervention schools took place which meant intervention effectiveness. (100%) of the students knew the modes of transmission of AIDS after the intervention as compared to a group of (41.2%) before the intervention. There was no significant change in the comparison schools from (31.0%) to (27.0%). The situation was similar to that found in a study carried out by Fawole, *et al.*, 1999 who assess a school – based AIDS education programme for secondary school students. The knowledge, attitudes and sexual risk behaviors of 223 students who received a comprehensive health education intervention were compared with 217 controls. At post-test, intervention students exhibited greater knowledge about HIV/AIDS transmission and prevention (P < 0.05).
Also, a study was carried out in Ghana by Aryeetey, 2000 aiming to provide students with current and accurate information on HIV/AIDS. Twenty student members underwent training to reach out to other young people between 10-35 years. The results revealed that many students gained knowledge on the modes of transmission and prevention.

The students’ knowledge was found to be that a considerable group (26.8%) knew the HIV carriers may appear healthy without symptoms of AIDS before the intervention. This percentage increased to include the majority of the students (94.0%). The difference was statistically significant (P. value = 0.000) reflecting the role of the intervention specially when compared to the control schools where there was no significant change from (28.0%) to (28.2%). The increased knowledge in the intervention schools was found to be similar to the findings of a study carried out in Byumba in Rwanda to assess knowledge, attitudes and practices (KAPs) among students at schools by Uhagaze, et al., 1999 which revealed that the knowledge on AIDS was good (80%) of questions were answered correctly and the fact that infected people may be without symptoms and appear healthy, the results indicated that AIDS clubs did improve the KAPs of students significantly.

Before the intervention some of the students (36.3%) knew that shaking hands with HIV carriers can not transmit HIV. This increased after the intervention to (98.1%). This increase was strongly related to the
intervention (P. value = 0.000). But there was no significant change in the comparison schools after the period of intervention from (28.2%) at baseline to (27.3%). Also before the intervention some of the students (30.3%) knew that mosquito bites can not transmit HIV. This increased after the intervention to (95.5%). This increase was strongly related to the intervention (P. value = 0.000). But there was no significant change in the comparison schools after the period of intervention from (23.2%) to (22.3%). The increased knowledge in the intervention schools was found to be similar to the findings of a study carried out by Aplasca, et al., 1995 to evaluate the effect of school-based AIDS-related knowledge, attitudes and preventive behavior. The results showed that after the implementation of AIDS prevention program, the intervention group was more likely to answer correctly that HIV can not be transmitted by mosquito bites (P = 0.01), through a cough or sneeze (P = 0.01) or by shaking hands with an infected person (P = 0.01).

A group of the students (23.2%) knew that AIDS has long incubation period before the intervention. This increased after the intervention to (89.3%) which was found to be significant (P. value = 0.000), reflecting the role of the intervention specially when compared to the comparison schools where there was no significant changes from (14.9%) at baseline to (16.8%) at final survey. This complied with what was stated by WHO, 1995 who mentioned that the incubation period is not known exactly. The
The period from infection to the appearance of definite signs and symptoms of the disease seems to range from 6 months to several years.

Before the intervention some of the students (28.9%) knew that AIDS patient can not restore his immuno-system. This increased after the intervention to (95.7%). This was statistically significant (P. value = 0.000) reflecting the effectiveness of school health education. But there was no significant change in the comparison schools from (22.7%) at baseline to (22.7%). WHO, 1995 mentioned that the immune system of AIDS cases is damaged, particularly due to the destruction of the helper T–lymphocytes by the virus, the mechanism of immune response to infection suffers considerably and thus the AIDS victim is left vulnerable to an array of life-threatening infections and malignancies.

A group of (34.1%) of the students knew that AIDS patient can not be cured before the intervention. This increased to (93.1%) after the intervention. The change was significant (P. value = 0.000), but there was no significant changes in the comparison schools from (28.2%) to (26.8%) which indicated the effective role of school health education. WHO, 2000 mentioned that AIDS is a dangerous disease that has no vaccine, treatment or cure for the time being. So the only mean to prevent the occurrence of HIV infection is health education.

The majority of students (91.5%) mentioned all the methods of protection from HIV infection in the intervention schools after the
intervention when compared to the situation before the intervention (41.9%). This was statistically significant (P. value = 0.000). There was no significant change in the comparison schools from (40.3%) to (40.5%). The results of the intervention were similar to the findings of a study carried out by Aplasca, et al., 1995 who mentioned that after implementing the AIDS prevention programme, the intervention group changes in knowledge about modes of HIV transmission were associated with improvements in preventive knowledge (P = 0.001). Also WHO, UNESCO, UNICEF 1992 reported that secondary school students are exposed today to new risks to health, they may be infected by HIV incidentally without knowing the modes of transmission or control measures.

Knowledge among the students in the intervention schools clearly increased specially with regard to changing risk behaviours as effective method in preventing HIV infection (32.9%) to reach the majority of the students (92.7%). This increase was significant (P. value = 0.000). The difference in the comparison schools reflected no significance from (41.5%) at baseline to (42.4%) at final survey. The increase in the intervention schools was similar to that mentioned by Bruce, et al., 1999 in a study carried out in the United States to study adolescent problem behavior in the seven middle schools. The study revealed that problem behavior was significantly higher (P <0.01) among the students and suggested that school bonding is associated with problem behavior and
multi–component interventions in school designed to increase students school bonding and prevent problem behavior. Also, WHO, 2006 mentioned that avoiding high-risk behaviours is the main strategy for preventing the young people in schools from HIV infection.

Also, Hira, *et al.*, 1995 mentioned that health education is a key element in the efforts used for prevention and control of HIV infection. the programmes designed to change sexual and other risk behavior is the most approach for reducing the spread of HIV.

Before the intervention some of the students (13.2%) disagreed with isolating people living with HIV from their families and community. This positive attitude increased after the intervention to (79.6%). This increase was statistically related to the intervention (P. value = 0.000). Yet, there was no significant change in the comparison schools after the period of intervention from (12.3%) to (13.0%). The results were similar to that found in a study carried out in Ghana by Aryeetey, 2000 aiming to provide students with accurate information about HIV/AIDS. The results showed that students gained knowledge on the mode of transmission and prevention care and support as well as the rights of PLWHAs.

Also, David, *et al.*, 1999 concluded that in a study carried out in large Midwest universities with the aim of providing information about medical students’ attitudes and knowledge regarding AIDS. Results indicated that students more tolerant towards AIDS patients. Also, Dickens,
1988 mentioned that the factors involved in preventing the spread of AIDS, in addition to preserving civil rights of those with AIDS, are complex issues involving sensitive and emotional concepts. Also, a study carried out in San Francisco by Siegel, et al., 1991 aiming to improve AIDS knowledge, attitudes and behavior of junior high school students. Findings support the possibility that improving knowledge about HIV transmission would result in more tolerance towards students with HIV infection.

A significant increase in positive attitudes towards people living with HIV, to be permitted to work in restaurants (P. value = 0.000) among the students in the intervention schools took place which meant intervention effectiveness. Before the intervention some of the students (21.1%) agreed, as compared to a majority of (87.9%) after the intervention. There was no significant change in the comparison schools from (15.4%) at baseline to (20.9%). The results were similar to that found in a study carried out by Swain and Namara, 1997 to measure the effects of a participative programme on Irish pupils’ attitudes to HIV/AIDS. The participative programme strongly influences AIDS – related attitudes, in particular, promotes compassion towards those with HIV/AIDS.

Also, a study was carried in Manila, Philippines by Aplasca, et al., 1995 to evaluate the effect of a school-based AIDS prevention program. The results showed that there was a significant effect on intended behavior.
The program was successful in improving attitudes towards people with HIV/AIDS.

Before the intervention, some of the students (38.2%) changed their behaviours and lifestyles after hearing and learning about AIDS. This increased after the intervention to (87.2%). This increase was statistically significant (P. value = 0.000). But there was no significant change in the comparison schools after the period of intervention from (37.0%) at baseline to (36.3%) at final survey. This was found to be similar to the findings of a study carried out by Mahat, et al., 2006 in New Jersey, USA aiming to prepare leaders in an urban high school to become peer educators using the program teens for AIDS prevention. Results showed that the peer education programs changed positively adolescent risk behaviors because of the influence of peer pressure during adolescence.

Half of the students in intervention schools (52.6%) terminated friendships after knowing the friend is an HIV carrier before the intervention. This reduced to (14.7%) after the intervention. This change was significant (P. value = 0.000). But there was no significant change in comparison schools from (61.4%) to (61.1%). The results were similar to that of a study carried out by Fawole, et al., 1999 who assess a school-based AIDS education programme for secondary school students in Ibadan, Nigeria. At post–test intervention the students exhibited greater knowledge
about HIV/AIDS transmission and prevention (P < 0.05), and were more likely to be tolerant of people living with the disease (P < 0.05).

Also, Klepp, et al., 1994 revealed in a study carried out in Arusha and Kilimanjaro regions, Tanzania, the effects of an HIV/AIDS education program for primary schools children. The results reported significantly in intervention schools the attitudes towards people with AIDS (9.0% versus 6.7%; PV = 0.000).

Also, Carballo, et al., 1996; Sapa, 1996 mentioned that involving people who are living with HIV/AIDS would be helpful for students to more deeply understand people who are living with HIV/AIDS.

Before the intervention some of the students (28.2%) discussed the topic of AIDS frankly with their friends. This increased to (79.4%) after the intervention. The difference was significant (P. value = 0.000). There was no significant change in the comparison schools, from (13.0%) to (14.5%). This was similar to that study conducted by Vicki, et al., 2002, which randomized controlled trial of peer-led sex education in English secondary schools. Peer educators reported positive changes in sexual knowledge and changes towards more liberal attitudes. There was an increase in confidence in relationships and on their sexual behaviour. Also, a study carried out by Aryeetey, 2000 in Ghana aiming to provide students with current and accurate information on HIV/AIDS and to use students as agents of change among families and peers. 20 students members
underwent training to reach out to other young people between 10 – 35 years. The results were that many students gained knowledge on the modes of transmission and prevention, care and support as well as the rights of PLWHAS.

A considerable group of students (27.5%) discussed the topic of AIDS frankly with their families before the intervention. This increased to (59.5%) after the intervention. This was found to be a significant change (P. value = 0.000). This supports the effectiveness of the school-based health education intervention, where there were no significant changes in the comparison schools from (11.4%) at baseline to (13.3%) at final survey. The change was found to be similar to the findings of Adu – mireku, 2003 in a study carried out in Accra, Ghana, with an aim to evaluate the relationship between family communication about HIV/AIDS and sexual activity among school-going adolescents. Results revealed that (73.6%) of the students had talked about HIV/AIDS with parents or other family members. The findings of this study suggest that prevention programmes that seek to educate Ghanaian school-going adolescents about sexual risk behaviour must strongly encourage communication about HIV/AIDS between students and family members.

Also, Hachonda, et al., 2000 in a study carried out in Zambia, revealed high levels of comprehension and acceptance of the messages of
AIDS prevention as well as reported discussion of the messages with peers and parents.

Before the intervention, half of the students (50.9%) agreed to do HIV test in intervention schools. This increased to (88.9%) after the intervention. The change was strongly related to the intervention (P. value = 0.000). Nevertheless, there was no significant change in the comparison schools after the period of intervention from (42.9%) to (41.7%). This complied with what was stated by SNAP Strategic Plan and Sectoral Plans on HIV/AIDS 2004 – 2009, who mentioned that one of the objectives of the plan was to provide voluntary testing and counselling in government and private health institutions.

According to the study, the majority of the students (96.7%) knew their role in controlling AIDS after the intervention as compared to (43.1%) before the intervention in the intervention schools. The change was significant (P. value = 0.000), but there was no significant change in the comparison schools from (44.0%) at baseline to (43.8%). The results of the intervention were similar to the findings of a study carried out by Pinneh, 2000 in Niger Delta regions about youth high risk behaviour for STDs/AIDS. The role model presentation is a system devised after a careful study. The strategy aims at reaching out to youths within the age bracket of 14–25 years in the rural communities of the Niger Delta area. Results revealed a wide-spread acceptance of this programme and those
ignorant youths could become role models for other youths and their communities.

Also, WHO, UNESCO, UNICEF, 1992 mentioned that students are receptive to learning and contribute a lot to combat AIDS. They constitute a force for change. So, if they are well-informed and educated in their schools about AIDS transmission and control, they can transfer AIDS education to their friends and communities.

Also WHO, 2006 mentioned that young people in schools can be educated about AIDS prevention using various interventions, including the involvement of peers, young people who can contribute a lot to combat the epidemic.

Also, SNAP Strategic Plan and Sectoral Plans for HIV/AIDS 2004 – 2009 mentioned that encouraging traditional beliefs and practices will enhance the positive behaviour that enable the youth to get married, discourage illegal sex outside the marriage and discourage negative sexual behaviour among youth, university students and other risk group.

Also, Gazairy, 1995 mentioned that prevention of AIDS remains an individual and social responsibility. Every individual should be sure that he adopts a life-style that keeps him safe from AIDS. Society should provide all that is necessary to help individuals to protect themselves against AIDS. This includes the provision of information on the disease and increasing
people awareness of all aspects of AIDS problems. It includes facilitating marriage for young men and women and helping them to preserve chastity.

A significant increase in knowledge about the religion role in protection against HIV infection (P. value= 0.000) among the students in the intervention schools took place which meant intervention effectiveness. The majority of the students (96.2%) believed that religion has a role in protection against HIV infection after the intervention as compared to (90%) before the intervention. There was no significant change in the comparison schools from (89.1%) to (91.7%). This complied with Arkangel, 1996 in a study carried out in Moyo, Northern Uganda, revealed that (16%) of teachers who attended participatory AIDS programme did not speak about condoms and said that condoms increase immorality which against the teachings of the Bible or the Koran.
4.2. CONCLUSION

The study confirmed the effectiveness of the school health education intervention in which participatory methods were predominating, in the promotion of the knowledge, attitudes and practices among the secondary schools students in Khartoum Locality towards HIV infection, which was reflected as a sharp variation in the promotion of KAPs among students in the intervention schools when compared to the students in the comparison schools.
4.3. RECOMMENDATIONS

According to the findings of the study, the following recommendations are held essential:

- Generalizing and establishing of teachers’ committees and training so as to be involved in the health education process among the students with regard to HIV infection is of great importance; the teachers’ role in health education should be considered.

- Health education programmes should be considered influential group in the community i.e., family members, religious leaders, teachers in schools and others to a more community-based participative approach.

- More definite researches are needed to examine the impact of health education as a medium for affecting knowledge, attitudes and practices regarding HIV infection in universities and communities.

- An intensive health education programme needs to be implemented to raise students’ awareness about HIV infection in comparison schools.

- The study training manual and the pamphlet are recommended to be considered by the Ministry of Education to integrate HIV/AIDS into regular education in secondary schools.
• The difficulty of speaking about AIDS modes of transmission and prevention with teenagers, suggested educating high secondary schools students in the native tongue with peers.

• To spread and strengthen school health education program among the students with respect to HIV infection in order to reinforce and promote the positive KAPs among students in both intervention and comparison schools, and to induce the desired change of the negative KAPs towards HIV infection among students in both intervention and comparison schools.

• Efforts should be make to benefit from strong religious beliefs on promoting healthy life-styles and refraining from unhealthy ones, including promiscuous sexual relations.
4.4. REFERENCES


4.5. APPENDICES