

**Aspects of Oral Health Care Services in the context of HIV and
AIDS in the Sudan**

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DEDICATION

This thesis is dedicated to the late professor *Nils Skaug*



1940-2007

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ALHAMDU-LILAH, TAGABAL WA BARIK

ACRONYMS

AIDS	Acquired Immuno Deficiency Syndrome
ANC	Antenatal Clinics
ART	Anti-Retroviral Therapy
<i>BMC</i>	Bio Med Central
BRFSS	Behavioral Risk Factor Surveillance System
CDC	Centre for Disease Control and prevention
CHAP	Community Health Assessment Project
CI	Confidence Interval
DMFT	Decayed, Missing Filled Teeth
HCW	Health Care Workers
HIV	Human Immunodeficiency Virus
KAP	Knowledge, Attitudes and Practices
KDTH	Khartoum Dental Teaching Hospital
MUHAS	Muhimbili University College of Health and Allied Sciences
OHCWS	Oral Health Care Workers
OR	Odds Ratio
PLWHA	People Living With HIV and AIDS
SARS	Severe Acute Respiratory Syndrome
sd	standard deviation
SNAP	Sudan National Aids Program
SPSS	Statistical Package for Social Sciences
SSA	Sub Saharan Africa

TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
UNAIDS	United Nations AIDS program
UNGASS	United Nations General Assembly Special Session
UST	University of Science and Technology
US\$	United States Dollar
VCT	Voluntary Counseling and Testing
WHO	World Health Organization

LIST OF PAPERS

Paper I Nasir EF, Astrøm AN, David J, Ali RW. HIV and AIDS related knowledge, sources of information, and reported need for further education among dental students in Sudan--a cross sectional study. BMC Public Health. 2008 Aug 14;8:286.

Paper II Astrøm AN, Nasir EF. Predicting intention to treat HIV-infected patients among Tanzanian and Sudanese medical and dental students using the theory of planned behaviour--a cross sectional study. BMC Health Serv Res. 2009 Nov 20;9:213.

Paper III Nasir EF, Astrøm AN, David J, Ali RW. Utilization of dental health care services in context of the HIV epidemic- a cross-sectional study of dental patients in the Sudan. BMC Oral Health. 2009 Nov 16;9:30.

ABSTRACT

Introduction: Sub-Saharan Africa is a home to 67% of all people living with HIV-infection. War and the resulting population movements, Sudan's long borders with countries which have high HIV-prevalence, all these conditions beside others interacted to provide an enabling environment for rapid spread of HIV infection. As the increase of the epidemic, the demand for care rises for those living with HIV and AIDS, with no exception among health workers.

Objectives: the overall aim of this thesis was to assess HIV and AIDS-related aspects in dental services in the Sudan. The thesis had the following specific objectives; to evaluate the HIV and AIDS-related knowledge of dental students, sources of information, and their perceived need for further education. To predict the intention of senior dental students in Sudan together with dental and medical students in Tanzania to provide surgical treatment to patients infected with HIV applying the theory of planned behavior (TPB). To assess the dental patients' utilization of dental services in the context of HIV and AIDS in Sudan using Andersen's Behavioral model of Health services utilization. **Methodology:** A census of senior dental students (3rd to 5th study year) in six dental faculties in Sudan beside dental and medical students in Tanzania participated in a self-administered questionnaire. A census of all dental patients attended two dental teaching hospitals (out-patient) in Khartoum during the period of the study. A designed interview was used, followed by a clinical examination. **Results:** Students from private dental schools were more knowledgeable about various HIV related issues than their counterparts from public dental schools. Publicly funded dental school students were less likely to have correct knowledge about modes of HIV transmission (OR = 0.6) and occupational risk groups (OR = 0.6) and to have received information from lectures/health care workers (OR = 0.5). Tanzanian and Sudanese students showed a strong intention to provide care for patients with HIV and AIDS. Theory of Planned Behavior accounted for 51% (43% in Tanzania and Sudan) of the variance in intention across study

sites. Across both study sites, attitudes were the strongest predictor of intention followed in descending order by subjective norms, moral norms and perceived behavioral control. With a response rate of 52% of dental patients, among predisposing factors; travelling inside Sudan (OR= 0.5) were associated with lower odds and females were associated with higher odds (OR= 2.0) for dental service utilization. While among enabling factors; higher knowledge of HIV transmission (OR = 0.6) and higher HIV related experience (OR = 0.7) were associated with lower odds, whereas positive attitudes towards infected people and high perceived risk of contagion (OR = 1.3) were associated with higher odds for dental care utilization. Among need related factors dental caries experience was strongly associated with dental care utilization (OR= 4.8). **Conclusion:** Students attending private dental schools were more knowledgeable about various HIV related issues than students from public dental schools. About half of all students reported need for further education. This suggests that students are not adequately prepared for treating patients with HIV infection and AIDS and that the dental school curriculum needs improvements. The TPB is applicable to students' care delivery intentions in the context of HIV and AIDS across the two countries investigated. It is suggested that attitudes, subjective norms, moral norms and perceived behavioral control are key factors in students' willingness to treat AIDS and HIV infected patients and should be targets of interventions aimed at improving the quality of health care delivery in this context. Disparity in the dental care utilization goes beyond socio-demographic position and need for dental care. Public awareness of HIV infection control and confidence on the competence of dentists should be improved to minimize avoidance behavior and help establish dental health care patterns in Sudan.

1. INTRODUCTION

1.1 Outline of the thesis

This thesis concerns HIV and AIDS-related aspects of the dental health care service by studying three different populations. Sudanese senior dental students and Tanzanian medical and dental students constituted the study populations in Paper I and Paper II, whereas dental patients attending dental clinics at dental teaching hospitals in Khartoum constituted the study population of Paper III. Data generated from Tanzanian students were recruited at Muhimbili University College of Health and Allied Sciences (MUHAS) in Dar-es- Salaam by Dr. Elizabet Lyimo and used as a comparative study group. The Sudanese dental students were recruited from six dental schools in Khartoum state by the author of this thesis (EFN).

Due to cultural factors and religious beliefs and due to a yet low prevalence of HIV-infected people in Sudan, it was assumed that HIV and AIDS related aspects of dental health care services were not given due attention in the education and practical training of dental students in Sudan. HIV and AIDS related issues are still sensitive in this country and thus Sudanese dental students were expected to have inadequate knowledge and to be in need for further education with respect to particular HIV and AIDS related topics. Following the theory of planned behavior, TPB, dental students' intention to provide surgical treatment to patients with HIV and AIDS were assumed to be predicted by attitudes, subjective norms, perceived behavioral control and moral norms across the Sudanese and Tanzanian cultural context. Following Andersen's behavioral model of health services uptake, dental health care utilization of patients attending teaching hospitals in Khartoum was assumed to be influenced by enabling factors in terms of HIV and AIDS related knowledge, attitudes and fear of

contagion, need related factors in terms in terms of clinically and self reported dental status and predisposing socio-demographic factors.

Specifically the present thesis considers:

- 1) Sudanese dental students' knowledge on HIV and AIDS-related aspects, sources of information and their perceived need for further education.
- 2) Sudanese dental students and Tanzanian dental and medical students as future providers of oral health care services with respect to factors predicting their intention to provide surgical treatment to patients infected with HIV as part of their future professional work.
- 3) Sudanese dental patients (as service consumers) and their use of oral health care services in the context of the HIV AIDS epidemic.

1.2 Conceptual models applied in the thesis

The theory of planned behavior (TPB) was applied in Paper II to explain Sudanese and Tanzanian dental students' intention to provide dental care for HIV infected people as part of their professional work. The TPB (1) (Fig 1) and its precursor the theory of reasoned action (TRA) (2) constitute promising frameworks for understanding and predicting social behaviors. The TRA applies strictly to volitional behaviors, Ajzen and Madden (3) proposed the TPB to account for non-volitional behaviors (Fig 1). The TPB includes *perceived behavioral control* on a level with *attitudes* and *subjective norms* as predictors of *behavioral intention* (1). The TPB implies that the three predictors influence subsequent behavior indirectly through behavioral intention, and further that the perceived behavioral control affects behavior directly when the behavior in question is not under complete volitional control by the individual. The TPB posits that behavioral intention is a function of attitude (reflecting a favorable or unfavorable evaluation of the particular behavior), and subjective norm (referring to the perceived social pressure to perform the behavior). Perceived

behavioral control (reflects the ease or difficulty associated with performance) and is closely related to the notion of self-efficacy (4). Attitudes, subjective norms and perceived behavioral control are underpinned by behavioral, normative and control beliefs, respectively.

The TRA and the TPB have been applied successfully to a range of behavioral domains (1, 5-7) including HIV preventive behaviors (8-13). With respect to occupational behavior, the TPB has predicted health workers'; use of gloves, their intention to provide home-care for HIV infected patients, their adherence to universal precautions for venipuncture and their intention to provide professional labor support (14-18). The applicability of socio-cognitive models to the African context should be systematically addressed, considering the need for theory-based studies in the planning and implementation of effective HIV and AIDS educational programs (19, 20).

Andersen's behavioral model of health service use was applied in Paper III to guide the selection of variables and the statistical analyses to identify correlates of use of dental health care services in the context of HIV and AIDS. According to this model, people's use of health service depends on *predisposing factors*, *enabling resources* and *treatment needs*.

Predisposing factors are the socio-demographics such as age, gender and ethnicity. Enabling factors include economic- and social resources, whereas need refers to the clinically assessed and self-perceived disease status (21, 22) (Figure 2). The Andersen model of health care utilization posits that predisposing characteristics, enabling resources and need factors influence dental service utilization. The variability of natural history of certain oral diseases, oral health beliefs, or genetic, cultural or social factors forms the construct of predisposing characteristics of individuals. Predisposing characteristics influence an individual's propensity to use different types of health services. Enabling characteristics include the economic and

social resources that facilitate or impede care. Need factors encompass both professionally determined need for dental care and patients' own perceptions of need. Predisposing characteristics and enabling resources are reportedly stronger predictors of dental care utilization than need factors (21-25). See Table 1 for an overview of studies applying Andersen's behavioral model in the field of use of oral health care services 1990-2010.

Figure 1: The Theory of Planned Behavior (Ajzen, 1991)

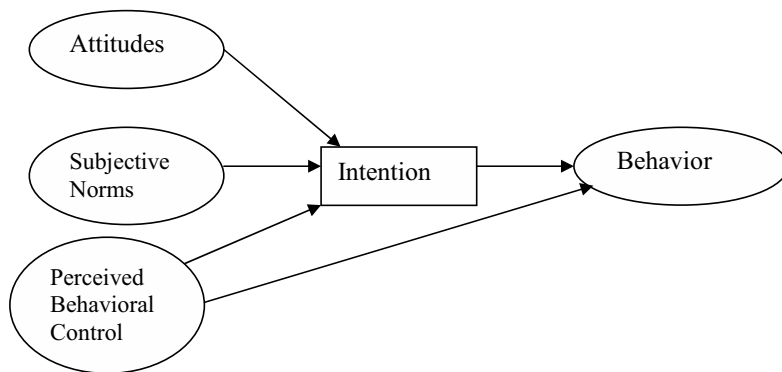
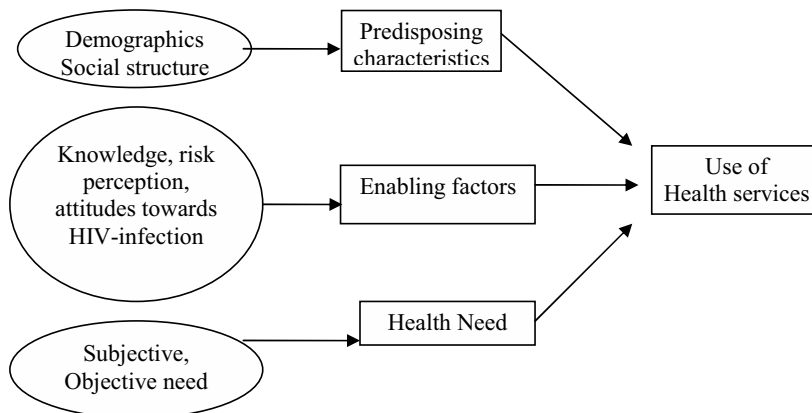


Figure 2: Modified Health Service Use Behavioral Model (Andersen, 1995)



1.3 HIV and AIDS epidemic globally and in the Sudan

The world has been facing a virus causing a disease that kills millions of people (26). The virus is called HIV, which stands for Human Immunodeficiency Virus. After a period of time this virus begins to damage the immune system, and this is known as Acquired Immuno Deficiency Syndrome (AIDS). The time period varies, depending on factors such as access to drugs and nutrition, the presence of other medical conditions, and stress (26). Globally in 2008, there were an estimated 33.4 million of people living with HIV. There were 2.0 million AIDS-related deaths and 2.7 million newly infected with HIV-infection (27). Sub-Saharan Africa is a home for 67% of all people living with HIV-infection (28). HIV and AIDS epidemic is no longer a crisis only for the health care sector, but a challenge to all other sectors. HIV and AIDS is a development question, being at the same time a cause and consequence of poverty and underdevelopment (29).

The first case of HIV-infection in Sudan was reported in 1986. This was followed by two cases in 1987. The number of cases reported annually increased, and by 1997 about 250 cases were reported. In 1998 the total number of cases was 511. The number of reported cases reached to 4004 reported cases in 2001. The HIV and AIDS epidemic in the Sudan is the most extensive in the North African region with a national adult HIV prevalence estimate of 1.4% in 2007. A prevalence of 9% was found among men having sex with men in Khartoum State (30). In the South of Sudan, the overall HIV prevalence of the Antenatal Clinic (ANC) respondents tested amounted to 3.7% (30). Similar to several other African countries, the main mode of transmission is heterosexual which accounts for 97% of the cases in Sudan. Use of condoms is not widely practiced (31).

War and the resulting population displacement, Sudan's long borders with nine African countries some of which have high HIV prevalence rates, the economic crisis in the country,

and urbanization with remarkable rural-urban migration are conditions that interact and increase the risk of a rapid spread of HIV infection. One objective of the Sudan HIV and AIDS national strategic plan is to maintain the level of HIV prevalence at less than 2% by 2009 (31).

1.4 Oral health care services in the Sudan

Dental services in Sudan are provided by private and public sectors. The public dental health care sector is administered by the Federal and state Ministry of Health. There are also military hospitals administered by the army and police department. In Khartoum state there are 173 private dental clinics whereas 504 dentists, 339 dental assistants and 30 dental technicians constitute the public dental health care sector (31). In the military hospitals, there are 7 dentists, 81 dental assistants and 4 dental technicians. The number of dentists in the public sector has increased from 244 to 512 between 2003 and 2007. The dentist population ratio in Khartoum state was 1.7: 100.000 by the year 2007. There is a high need for more dentists as 1220 dentists is estimated to be needed by 2013(32). Dental education has since 1971 been provided by the University of Khartoum through its dental school at the Faculty of medicine. This dental school was upgraded to a Faculty of Dentistry in 1992(33). Many private and public dental schools/faculties have been initiated within the emergence of private sectors education institutes. Currently the total number of dental graduates per year is almost exceeding 300 graduates.

1.5 Provision of oral health care services in the context of the HIV and AIDS Epidemic

The HIV and AIDS epidemic is bringing an additional burden on the health care sector generally. In sub-Saharan Africa, the annual direct medical costs of AIDS (excluding

antiretroviral therapy) have been estimated at about US\$30 per capita, at a time when overall public health spending is less than US\$10 for most African Countries (34). The overall quality of care provided in hospitals is affected by the HIV and AIDS epidemic (35). The transmission of HIV-virus has had its impact on dental health care services. The risk for cross-infection has become into particular focus in dental practices, due to the possible transmission of HIV-virus through direct contact with blood, (36). Cross-infection can take place from dentist to patient and vice versa. However, the estimated risk of HIV transmission from general practice dentists to their patients is recognized to be minimal if infection control guidelines are strictly adhered to (37). Revision and advocacy for standard precautions in cross-infection control has taken place with the emergence of the epidemic(38). In the developing countries where occupational safety is neglected, about 90% of the total HIV infections occurs among health care workers, annually (39).

All health care workers including the dentists should provide comparable treatment and care to all individuals indiscriminately. Accordingly, dentists have a professional and ethical responsibility to serve patients with HIV and AIDS, (40-42). This has also been supported by the Dental Associations throughout the world (43-45). Knowledge about HIV-infection is recognized as a critical component for the control and management of this disease (46). It is generally agreed that there is need for better professional education concerning HIV and AIDS among health care workers (47). Proper training on medical and psychological aspects of treating HIV positive patients has been recognized as an effective method to change the attitudes towards HIV and AIDS among dental health care workers (47, 48). A sound basis of knowledge about HIV and AIDS is essential to enable dental students to undertake appropriate measures during clinical practice. In addition, it is also likely that possessing appropriate information may instill confidence in their ability to diagnose and then manage

HIV-infected patients. Fear or AIDS-phobia has been attributed to inadequate knowledge about HIV and its transmission routes (49). Fear of contagion with HIV-infection generates major concerns among health care personnel and may impede educational efforts about AIDS. This might lead to a variety of adverse outcomes such as unwillingness to treat AIDS patients altogether(50). Several authors have attributed fear of contagion to inadequate HIV-related knowledge, whereas others have demonstrated a reduction in fears through improved AIDS education (47, 51). Inadequate knowledge has also been identified to contributing to dentists' unwillingness to provide care for HIV-positive patients (Table 2).

Table: 1 Studies on oral health workers' HIV-related knowledge, attitudes and behaviors 1999-2009

Authors	Country	No.	Subjects	Type	Conclusion
Sadeghi and Hakimi (2009) ⁽⁵²⁾	Iran	455	Dental students		Excellent knowledge. 1% positive attitudes treating HIV patients.
Vázquez-Mayoral, Sánchez-Pérez et al. (2009) ⁽⁵³⁾	Mexico	146	Dental Deans' and Dentists		HIV and AIDS patients must be treated in specialized clinics.
Bukar, Gofwen et al. (2008) ⁽⁵⁴⁾	Nigeria	75	dental professionals		Discriminatory attitudes and behavior towards HIV patients.
Kocić, Petrović et al. (2008) ⁽⁵⁵⁾	Serbia		health care personnel		A need for educational initiatives of HIV and AIDS.
El-Maaytah, Jerjes et al. (2008) ⁽⁵⁶⁾	Jordan	290	Dentists		Need for better informed.
Olapade-Olaopa, Salami et al. (2006) ⁽⁵⁷⁾	Nigeria		The surgeon		Need to increase the awareness about universal precautions.
Adedigba, Ogunbodede et al. (2005) ⁽⁵⁸⁾	Nigeria	79	oral health care workers		Males faring better attitudes with HIV/AIDS patients
Ogunbodede, Folayan et al. (2005) ⁽⁵⁹⁾	Nigeria	64	oral health workers		Efforts to train OHCWS on HIV and AIDS.
Obi, Waboso et al. (2005) ⁽⁶⁰⁾	Nigeria	264	Surgeons		Need for a comprehensive AIDS management package.
Senna, Guimaraes et al. (2005) ⁽⁶¹⁾	Brazil	140	Dentists		Fear of contamination in dealing with HIV patients.
Erasmus, Luiters et al. (2005) ⁽⁶²⁾	South Africa	150	Dental, oral hygiene students		Knowledge on HIV increased, but infection control lacked.
Comfort, Vandana et al. (2004) ⁽⁶³⁾	Pacific region	20	Dentists		Need for continuing education HIV.
Ogunbodede and Rudolph (2002) ⁽⁶⁴⁾	South Africa	250	Senior officers		Gaps in policies and protocols on HIV and AIDS.
Oliveira, Narendran et al. (2002) ⁽⁶⁵⁾	Brazil	105	Dental students		A curriculum on HIV and AIDS is recommended.
Gachigo and Naidoo (2001) ⁽⁶⁶⁾	Kenya	68	Dentists		Need for continuing education courses.
Yengopal, Naidoo et al. (2001) ⁽⁶⁷⁾	South Africa	103	Dentists		Low Adherence to infection-control increasing HIV pandemic.
Luevswanij, Nittayananta et al. (2000) ⁽⁶⁸⁾	Thailand	76	Oral health personnel		Improvement in many domains of KAP.
Rudolph and Ogunbodede (1999) ⁽⁶⁹⁾	South Africa	276	Dentists		Need to improve application of universal precautions.

Table: 2 Studies applying Andersen model on Oral Health Care Use 1990-2010

Authors	Country	Subjects No	Type	Conclusion
Baker (2009) ⁽⁷⁰⁾	UK	3815	Adults patients	Enabling resources need predicted use of services.
Kaylor, Polivka et al. (2009) ⁽⁷¹⁾	USA	9819	Women patients	Dental need, type of coverage associate with utilization of dental services.
Matos and Lima-Costa (2007) ⁽⁷²⁾	Brazil	28943	≥ 60 yr patients	Predisposing, need, and enabling factors associate with use of dental services
Varenne, Petersen et al. (2006) ⁽⁷³⁾	Burkina Faso	3030	Adults ≥15 yr	Socio-economic, cultural factors associate with the use of oral health services.
Born, Baumeister et al. (2006) ⁽⁷⁴⁾	Germany	4310	20 - 79 years patients	The subjective need, bonus scheme are important for health care.
Skaret, Weinstein et al. (2004) ⁽⁷⁵⁾	USA	439	12-20-year patients	Untreated tooth decay is associated with avoidance of care.
Dobalian, Andersen et al. (2003) ⁽²⁴⁾	USA	2864	18-77-year under HIV-treatment	HIV-related symptoms and AIDS have a greater need for dental care.
Ekavayake and Mendis (2002) ⁽⁷⁶⁾	Sri Lanka	210	21-45-year Employees	Gender and presence of pain predict dental utilization.
Matos, Lima-Costa et al. (2001) ⁽⁷⁷⁾	Brazil	999	≥ 18 years patients	Use of dental services was related to factors in the Andersen model.
Fernández-Mayoralas, Rodriguez et al. (2000) ⁽⁷⁸⁾	Spain	3154	≥ 65 –year patients	The predisposing enabling variables are relevant in the use of dental services.
Atchison and Andersen (2000) ⁽⁷⁹⁾	USA + Int.	1848	65-74-yr-old patients	Andersen model was useful in studying dental services.
Lo and Schwarz (1998) ⁽⁸⁰⁾	Hong Kong	322	middle-aged Chinese	Dental coverage, prevention attitudes, related to visiting a dentist.
Andersen RM and Davidson (1997) ⁽²³⁾	USA	4404	35-44, 65-74-year	The framework can be applied to predict health behaviors and outcomes.
Schwarz and Lo (1994) ⁽⁸¹⁾	Hong Kong	398 + 559	Chinese ≥ 70 year	Increased regular dental care with access and perceived a need of treatment.
Tennstedt, Brambilla et al. (1994) ⁽⁸²⁾	Hong Kong	3815	Adults patients	Need, source of care and higher social class were associated with frequent visits.

1.6 Use of dental health care services in the context of the HIV and AIDS Epidemic

Recent findings based on the 1998 Community Health Assessment Project (CHAP) and the Behavioral Risk Factor Surveillance System (BRFSS) have revealed that *socio-demographics* in terms of race (whites more likely to visit the dentist), income (higher income most likely to visit the dentist), education (higher education more likely to visit the dentist) and marital status (married most likely to visit the dentist) are the most important determinants of dental visiting habits in the general US population (38, 83, 84). Several other factors have also been reported to be associated with use of dental care, such as gender, non-poverty status, having a positive attitude towards dental health and dental health care, having pain and being dentate (38, 84, 85).

Empirical evidence suggests that HIV and AIDS related knowledge and attitudes varies considerably in the general population and tend to influence dental attendance patterns. In a Nigerian study of public perceptions of cross-infection control in dentistry, more than half of the respondents investigated felt that they could contract an infection in the dental clinic and 43% identified HIV as a risk (86). Pistorius et al (87) examined dental patients in Germany and found that about 17% were generally afraid of contracting an infection at a dental office. Thomson et al (88) examined perceptions of cross infection in dentistry among Australians and found that 3.6% reported delayed or avoided dental visits due to perceived cross infection, the avoidance rate being highest in females and those who reported concern about cross infection control. A Mexican study revealed that only 21.2% of the study participants intended to continue treatment at a dental practice where

HIV patients were treated and 20% had similar intentions if the dentist was HIV positive (89).

Studies of dental patients from developing and developed countries have revealed that dental patients expect adequate infection control procedures and are informed that such measures are beneficial to both dental staff and patients (86). On the other hand, dental patients being totally ignorant to the sterilization methods utilized in dentistry have also been reported (90). In Nigeria about 60% of the study participants were unwilling to attend a dental clinic if they knew that HIV patients were treated there (86). Consistently, a German study of dental patients revealed that about 10% were in favor of separate waiting rooms for HIV infected patients (87). Personal experience with HIV and AIDS acting as a barrier towards utilization of dental care might be attributed to the fact that the estimated prevalence of HIV and AIDS is still low in Sudan and with a general trend of keeping HIV infection in secret (91). Studies from other industrialized countries have shown that concern about HIV contagion in dental practices increases the likelihood of dental avoidance behavior(88).

1.7 Justification

The three papers of this thesis are justified by the fact that Sudan is experiencing an increase in the prevalence and incidence of HIV and AIDS. This will impact providers and consumers of dental health care services in the country. HIV-infection is related to oral health in many aspects and puts obligations upon various categories of health care personnel with respect to infection control, early diagnosis, management and quality care

for people living with HIV and AIDS. Yet, the education of Sudanese dentists in the context of HIV and AIDS has not been adequately evaluated. Information on dental students' HIV related knowledge and attitudes might provide a valuable contribution to the development of adequate education and training. Moreover, the burden of the HIV and AIDS epidemic on the health care services in terms of attrition of health care personnel needs to be put into a working module to form a basis for health promotion and policy making. This situation might influence not only the provision of oral health care, but also the dental attendance patterns in the general population. Dental health care utilization in the context of HIV has yet to be explained to provide a basis for the planning and implementation of public's health education and provision of quality dental health care services.

1.8 Aim

This thesis examined HIV and AIDS related knowledge, attitudes and need for further HIV and AIDS related education among Sudanese students, explained dental students' intention to provide treatment to HIV infected patients as part of their future professional role across Tanzanian and Sudanese cultural contexts and explained the utilization of dental care in the context of an increasing HIV epidemic in the Sudan. Such information is pivotal for the planning and implementation of public programs aimed at improved provision as well as utilization of oral health care services in the context of the HIV and AIDS epidemic.

1.9 Specific objectives

Paper I: One important step in preventing the spread of HIV-infection in Sudan is to assure that dentists are capable to recognize and manage HIV-related oral health problems and to educate patients about risks that might lead to infection. It is upon this background the present study was set out to assess HIV and AIDS-related knowledge, sources of information, and perceived need of further education of dental students attending public and private dental schools in Sudan.

Paper II: Focusing on Tanzanian and Sudanese dental- and medical students, this study aimed to predict their intention to provide surgical treatment to patients living with HIV and AIDS as part of future professional work, using the Theory of Planned Behavior (TPB). Identical questionnaires were used in both countries. Following the TPB, the hypotheses were: attitudes, subjective norms and perceived behavioral control will each contribute positively to the prediction of intention of the students to provide surgery treatment to HIV and AIDS patients.

Paper III: Recruiting Sudanese dental patients with reported unknown HIV-status, this study assessed the extent to which the components of Andersen's model in terms of predisposing factors, enabling factors, and need predict dental care utilization. It was hypothesized that enabling factors in terms of HIV-related knowledge, attitudes and fear of contagion would add to the explanation of dental care utilization independent of predisposing- and need related factors.

2. MATERIALS AND METHODS

Figure 3: Map of Sudan and Africa [Source: (92):



2.1 Study area

Sudan, is the largest country on the sub-Saharan Africa continent, measuring about one-fourth the size of the United States (93). The country occupies the middle part between Africa and the Arab World. Its neighbors are Chad and the Central African Republic on the West, Egypt and Libya on the North, Ethiopia and Eritrea on the East, and Kenya, Uganda, and Democratic Republic of the Congo on the South. Sudan is formed of 26 states (93). Khartoum state is the capital and comprised of three cities, Khartoum city (the political capital), Omdurman (the national capital) and Khartoum North (the industrial capital). Khartoum has the area of 22.736 Km² with population (in 2007) of

6203000, which is 16.7% of the total population. There are 25 hospitals and 25 Primary Health Care Unites (32). Table3 shows facts about Sudan population.

Table: 3 Fast Facts About Sudan Population (92):

Population: 41.087.825	Ethnic groups: black 52%, Arab 39%, Beja 6%, foreigners 2%, other 1%
Birth rate: 33.74 births/1.000 population	Religions: Sunni Muslim 70% (in north), Christian 5% (mostly in south and Khartoum), indigenous beliefs 25%
Death rate: 12.94 deaths/1.000 population, (2009 est.)	Languages: Arabic (official), English (official), Nubian, Ta Bedawie, diverse dialects of Nilotic, Nilo-Hamitic, Sudanic languages
Life expectancy at birth: total population 51.42 years, (2009 est.)	Infant mortality rate: 82.43 deaths/1,000 live births, (2009 est.)
Growth rate: 2.143%, (2009 est.)	Urbanization: 43% of total population (2008), with a rate of urbanization: 4.3% annual rate of change (2005-10 est.)
Sex ratio: total population: 1.03 male(s)/female (2009 est.)	Fertility rate: 4.48 children born/woman (2009 est.)

2.2 Selection procedures and study population

This thesis is based on three separate surveys. Survey I and Survey III were conducted in Khartoum state, Sudan, whereas Survey II was conducted in Dare es Salaam, the capital of Tanzania (Table 4).

Table: 4 Surveys of the Thesis:

Survey	Paper	Study group description
I	Paper I &II	Census: dental students 3 rd , 4 th , and 5 th year, April-May 2007, Khartoum, Sudan , n = 642
II	Paper II	Census: medical and dental students attending MUCHS, Dar Es salaam, 2005, n = 454
III	Paper III	Study group: dental patients attending KDTH and UST, Khartoum, April-June 2008, n =1262

2.2.1 Survey I

The data of (survey I) which applies to Paper I and II, was collected through a cross-sectional study that was carried out in April–May 2007 among a census of Sudanese dental students attending the 3rd, 4th and 5th study year in 6 dental faculties in Khartoum state. A list of all the dental faculties was obtained from the Ministry of Higher Education and lists of all registered students in the 3rd, 4th and 5th years were obtained from all faculties through the Dean’s office. The faculties included in this study were publicly and privately funded. Moreover, they represent all available dental faculties in Sudan admitting from all over the country. The total number of dental students registered by the time of the survey was 782 (3rd, 4th and 5th graders). All were invited to participate in the study by completing self-administered, anonymous questionnaires in supervised (by teaching assistants) class-room settings. The main reason for non-participation was absenteeism on the day of the data collection. Before being used in the field, the questionnaire was reviewed by experienced local researchers, dental academics and health administrators. The questionnaire was constructed and administered in English,

contained 44 questions regarding HIV and AIDS related knowledge, sources of information and need for further education (Appendix 1).

2.2.2 Survey II

The material of Survey II which applies to Paper II was generated from Survey I and from a cross-sectional study carried out from June to September 2005 at Muhimbili University College of Health and Allied Sciences (MUHAS) at the University of Dar es Salaam. The target population consisted of students attending the faculty of dentistry and medicine in Dar es Salaam. In Dar es Salaam, a total of 1,021 (862 medical and 159 dental) students were enrolled at the college in 2005. Six hundred students (100 students in each study year) attending the 1st to the 5th study year were invited to participate and complete supervised self-administered structured questionnaires at the faculty in classroom settings. The questionnaire was adapted from a questionnaire previously employed in SSA (94). It was constructed and completed in English. The questionnaire covered socio-demographic factors and each component of the TPB developed according to the guidelines proposed by Ajzen and Fishbein (2) (Appendix 2).

2.2.3 Survey III

The data of Survey III which applies to Paper III was collected through a cross-sectional hospital-based study in Khartoum state from March to July 2008. Dental patients were recruited from dental clinics at two teaching hospitals in Khartoum state, Khartoum Dental Teaching Hospital (KDTH) and University of Science and Technology (UST). The number of new patients per day range from 30 to 50 at (UST) and 70-100 at

(KDTH). The hospitals are the biggest dental hospitals in Sudan. People of all socio-economic classes are attending these two hospitals. All patients between 20 and 60 years of age with reported unknown HIV and AIDS status were invited to participate in the study. Reason for not participating was mainly due to time constraints and eagerness to receive the dental treatment. A sample size of 1200 patients was assumed to be satisfactory for a two-sided test assuming the proportion of dental care utilization in the previous 2 years to be 0.15 and 0.20 in patients with respectively low- and high education, a significance level of 5% and a power of 95%.

2.3 Interviews

A structured face-to-face interview including, questions on socio-demographic characteristics, oral health-related behaviors, HIV-related knowledge, attitudes and sources of information. Two dentists (a male and a female) were assigned and trained for carrying out the interviews. The behavioral model proposed by Andersen (21) was applied to identify variables to be considered relative to the use of dental health care services (Appendix II).

2.4 Oral Examination

One trained and calibrated dentist (EFN) conducted all clinical examinations in dental clinic settings equipped with an adjustable dental chair and artificial lightening. Examination was conducted using disposable gloves, sterilized dental mirrors and dental explorers. Dental caries was recorded using the Decayed, Missing, Filled Teeth (DMFT)

index, according to the guidelines by WHO (95) and recorded 0 or 1 (no caries experience, DMFT>0) (Appendix 3) .

2.5 Characteristic of data and statistical analysis

Before administration in the field, the questionnaires were reviewed by experienced local researchers, dental academics and health administrators. Dental patients' questionnaire was constructed in English and translated into Arabic by a dentist and then re-translated back to English by another dentist to check for consistency in the language. It was used in Arabic. This instrument has been employed previously among university students in East Africa (96). Duplicate clinical caries registrations with 2 months interval were carried out by the researcher (EFN) among fourteen chair side dental assistants at UST. Intra examiner reliability in terms of Cohen's kappa for the DMFT components was 1.

All data were entered into the computer and all analyses were carried out by using Statistical Package for Social Sciences software (SPSS for Windows version 15.0) (97). The data processing and analysis included two steps a descriptive phase to give the primary picture of the data. Analytic phase, with all necessary tests of significance and measures of associations between different variables (qualitative and quantitative) were used accordingly. A confidence interval of 95% and P-value of $P < 0.05$ was considered statistically significant (Table 5).

Table: 5 Statistical tests applied in the thesis:

Statistics and methods used	Paper I	Paper II	Paper III
Frequencies	+	+	+
Pearson's Chi-Squared test	+	+	+
Multiple Logistic Regression	+	+	+
Confirmatory factor analysis		+	
Cronbach's alpha		+	
Pearson's correlation coefficients		+	
Linear multiple regression analysis		+	

2.6 Ethical Considerations

The participants invited to participate voluntarily, after having all the details explained. Written informed consent was obtained from all participants. The questionnaires maintained the participants' confidentiality and privacy by not registering the names of the participants. Patients were interviewed in a confidential atmosphere while waiting for the clinical examination. All necessary approvals and clearance letters were obtained prior to the conduction of the study. A formal ethics waiver was received from the research committee at the University of Science and Technology. All included faculties provided approval letters before conducting the study.. Ethical permission was obtained from the Norwegian Regional Ethical Committee, Sudan National AIDS Program (SNAP) and from the UST, and KDTH. All data were kept under the researchers' control and responsibility. The results of the study were published, distributed and used where is needed for the benefits of the public.

3. RESULTS

3.1 Paper I

Elwalid Fadul Nasir, Anne Nordrehaug Åstrøm, Jamil David and Rouf Wahab Ali, HIV and AIDS related knowledge, sources of information, and reported need for further education among dental students in Sudan- a cross sectional study. BMC Public Health 2008, 8:286.

With a response rate of 82%, 642 students (3rd, 4th, 5th year of study) with (mean age 21.7 yr, 72% females) 48.6% from publicly funded and 51.4% from privately funded dental schools in Khartoum participated in the study. Of public dental school students 42.2% and 59.1% of the private dental school students were in the older age group of 22–30 year ($p < 0.001$). The most frequently reported sources of information related to HIV and AIDS by students were Lectures and Radio/TV 61% and 44% consecutively, whereas information from friends/relatives (31%) and health care workers (39%) were less frequently reported. Public dental students reported more frequently Radio/TV (63% versus 44%), whereas private dental students reported more frequently lectures (67% versus 53%) as sources of information. About half of all students, 47.6%, confirmed a moderate to high need for further education across topics related to HIV and AIDS. A higher proportions of students from public dental schools than from private dental schools reported need for further education. Health workers (79.1%) and barbers (74.5%) were the risk groups most frequently recognized by the students. Knowledge about risk groups varied across institutions with private dental school students being more

knowledgeable. A majority of students had accurate knowledge regarding modes of transmission varying between 85% and 97%. Private dental student and having highly educated father have higher odds (OR = 0.6) of reporting better knowledge than their counterparts. Public dental school students and younger age groups were less likely than their counterparts to report information received from health care workers/lectures (OR = 0.5) and to have good knowledge on HIV and AIDS related occupational risk groups (OR = 0.6).

3.2 Paper II

Anne N Åstrøm and Elwalid F Nasir, Predicting intention to treat HIV-infected patients among Tanzanian and Sudanese medical and dental students using the theory of planned behavior - a cross sectional study, *BMC Health Services Research* 2009, 9:213.

Tanzanian and Sudanese students showed a strong intention to provide surgical treatment for people with HIV and AIDS. TPB accounted for 51% (43% in Tanzania and Sudan) of the variance in intention across study sites. After controlling for country and past behavior, the TPB in terms of attitudes, subjective norms and perceived behavioral control accounted for 34% and moral norms for an additional 2,3% of the explainable variance in intention. Across both study sites, attitudes were the strongest predictor of intention followed in descending order by subjective norms, moral norms and perceived behavioral control.

3.3 Paper III

Elwalid Fadul Nasir, Anne Nordrehaug Åstrøm, Jamil David and Raouf Wahab Ali, Utilization of dental health care services in context of the HIV epidemic- a cross-sectional study of dental patients in the Sudan, *BMC Oral Health* 2009, 9:30.

A total of 1262 dental patients participated in the study (mean age 30.7, sd 8.5), 56.5% females and 61.0% from KDTH, while patients attending UST were less frequently males (35.2% versus 48.6%), less frequently in the younger age group (47.6% and 58.3%), and had more frequently travelled outside Sudan (41.5% versus 26.9%) as compared to their KDTH counterparts. Moderate proportions of patients scored high on information received 60.5%, knowledge on transmission 73.3% and knowledge on risk groups 66.8%. Moderate proportions had positive attitudes towards HIV dental clinics and people with HIV and AIDS 35.1% and 49.6%. A majority reported no experience with HIV infected people 75.6%, fear of HIV contagion in the dental environment 75.6%. Good oral and general health condition were reported by 56.3% and 73.3% respectively. A total of 53.9% of the patients confirmed dental treatment at least once during the 2 years preceding the study. Use of dental service varied systematically between different socio-demographic factors. Use of dental care varied systematically with caries experience (20.0% versus 54.7% in patients without and with dental caries). Stratified analyses by perceived health status revealed that among patients who perceived their health status to be good, those with caries were more likely than their caries-free counterparts to have visited a dentist during the 2 years preceding the study (OR= 10.3 95% CI 2.3-45.3).

Among patient with bad health perceptions the relationship between DMFT status and dental health care services use was not statistically significant (OR=1.8, 95% CI 0.5-6.3).

4. DISCUSSION

In the following section, the main findings of the three papers will be discussed briefly in terms of stated objectives and in the light of their implications for oral health education and dental care. More comprehensive discussion is presented in the individual papers. Prior to discussing the main findings, some methodological issues of importance are defined and discussed.

4.1 Methodological issues

The data utilized in this thesis was collected in three cross-sectional sample surveys using self-administered questionnaires, interview and oral clinical examinations. Sample surveys are designed by definition to provide estimates of the characteristics of a defined population (98). The first study population consisted of Sudanese dental students attending the 3rd, 4th and 5th study year in 6 dental faculties in Khartoum state. The second study population consisted of Tanzanian medical and dental students attending Muhimbili University College of Health and Allied Sciences in Dar es Salaam, Tanzania. The third study population consisted of dental patients attending dental clinics at two teaching hospitals in Khartoum state. The main strength of the present study, as one of the advantages of a sample survey approach, is that it yields information on many variables of a large number of people at a relatively low cost (98). However, it might be subject to various sources of error, which might bias the results and the conclusions provided (99). *Bias* is any systematic error in the data and occurs as two major categories. Selection bias stems from study participants (*e.g.* non response) and information bias or

misclassification stems from errors in the information collected from participants (*e.g.* recall bias). The methodological problems associated with the present approach are discussed in detail in the separate papers. Some of the most important limitations are discussed below.

4.1.1 Reliability

Reliability is concerned with the degree of consistency or accuracy with which an instrument measures an attribute (98, 100). An instrument is recognized to be reliable when it maximizes the true component and minimizes the error component of the score. The stability aspect of reliability (precision) can be assessed by comparing the same measure for the same sample at two or several points in time and then translating it into convenient statistics (101). There are four types of reliability, each of which estimates reliability in a different way; inter-rater or inter-observer reliability denotes the degree to which different raters/observers give consistent estimates of the same phenomenon, test-retest reliability denotes the consistency of a measure from one time to another, parallel forms reliability denotes the consistency of the results of two tests constructed in the same way from the same content domain whereas internal consistency reliability is used to assess the consistency of results across items within a test (102). A test-retest approach was applied with respect to the clinical examination in survey III. Other measures to ensure data quality comprised the training of research assistants, use of pilot studies and repeated checks during the data entry process. Due to logistical reasons, test-retests of self-reported data collected in Survey I, II and III could not be carried out. For measurement of consistency, duplicate clinical caries registration was carried out with 2 months interval among 14 chair side dental assistants at UST. The intra-examiner

reliability for the DMFT was 1, indicating very good agreement according to Landis and Koch (103).

Cronbach's alpha (104) was used to assess internal consistency reliability of the TPB constructs in survey II. Cronbach's alpha ranged from 0.83 (moral norms/subjective norms) to 0.44 (attitudes) in Tanzania and from 0.81 (attitudes/intention) to 0.45 (subjective norms) in Sudan (105). The more homogenous the items, the higher the correlation (Cronbach's alpha), and therefore the more reliable the measure, indicating that the items comprising a scale measure the same underlying concept. Since the coefficient alpha is a function of the number of items comprising a scale, there might be problems with its use as a measure of consistency. Robinson (106) have maintained that an alpha coefficient above 0.80 is exemplary, in the range between 0.70 and 0.79, extensive, whereas an alpha coefficient in the range 0.60-0.69 indicated internal consistency below moderate level for attitudes whereas the other constructs had exemplary alpha coefficients.

4.1.2 Validity

A measure, test or scale is said to be valid if it measures what it claims to measure (101). Internal validity deals with the question of whether a true measure is obtained for the subjects under study. External validity relates to whether it is permissible to generalize findings from the sample to a wider population (98).

4.1.2.1 Internal validity

For optimal diagnosis of dental caries, x-ray units, adequate lighting and patient's dental records to obtain reasons for missing teeth would be required. The oral examination was carried out in a clinical setting offering the required circumstances for optimum diagnosis of dental caries. All oral examinations were performed by one researcher who had been working in the out-patient clinic for one month prior to the start of the data collection. Registration of the clinical data was performed in accordance with the WHO recommendation of DMFT (95). Using this field method for data collection, the possibility of misclassification by underreporting the prevalence of dental caries cannot be ruled out as a 100% correct caries diagnosis requires a more sophisticated clinical set up with use of X-ray units, optimal cleaning and drying of teeth, adequate light etc. To limit biases in clinical registrations, the dentist (EN), was calibrated before the main survey. It was also ensured that the clinical examinations adhered to the criteria set for field surveys by the WHO (107).

Survey I and II relies entirely on self-reported data. Common threats to the validity of self-reported data that can lead to information bias are social desirability and recall bias. Retrospective studies are always prone to recall bias and students' ability to recall past events and interpret the questions might have influenced the validity of their answers, which indicates the respondents' tendency to represent a favorable image of one-self. In addition, there is a possibility that socially desired and undesired behaviors have been over- and underestimated in both Surveys I and II. To overcome the problem, the questions utilized were sufficiently simple and unambiguous to facilitate interpretation.

The questionnaire was used previously and validated in Eastern Africa. Any type of validation may be considered construct validation addressing the degree of confidence that can be placed in the inferences drawn from scores and scales. Since construct validity is dependent on theory, the empirical tests of hypotheses derived from TPB (paper II) and Andersen's model (paper III) is as much a test of validity as it is a test of those theories and models. The magnitude of the correlations presented, and the findings harmonizing with the TPB indicate acceptable reliability and validity of the results.

4.1.2.2 External Validity

The students investigated in Survey I and II might reflect the variety of characteristics of Sudanese and Tanzanian dental and medical students of that age attending respectively 6 dental schools in Khartoum and the Muhimbili University of health and Allied Sciences in Dar Es-Salaam. Although Survey III provides valuable information on dental patients, it is not clear how close an approximation the present estimates are to the real situation in the general population of adults in Khartoum state. Thus, studies based on random samples from the general population are recommended subsequent studies to provide answers as to whether dental attendees and non attendees differ regarding their perception of HIV-related issues and contagion in the dental environment. A census of Sudanese and Tanzanian students were invited to participate in Survey I and II, and all patients attending the KDTH and UST hospitals during the survey period, taking this opportunity relied on each single eligible individual. Initial differences due to self-selection attrition might have created a divergence between the targeted student populations and the studied ones. A bias towards health conscious participants is a well-known problem in studies

where participation is voluntary (108). Nonetheless, lack of information about non-respondents precludes any firm conclusion about selection bias and implies that the results of the present surveys should be drawn with caution. There was a good response rate (over 70 %) obtained in surveys I and II. These high response rates were probably due to the clear and appropriate information given to the respondents and to the pre-testing exercises.

4.2 Comments on the main findings

4.2.1 HIV and AIDS-related knowledge, sources of information and need for further education among dental students

Effective promotion of quality oral health care delivery in the context of HIV and AIDS requires information about dentists' and dental students' HIV-related knowledge, sources of information and their perceived need for further education. Sudanese students' knowledge with respect to HIV and AIDS varied in different aspects. The proportions of students having accurate knowledge with respect to people at risk for HIV/AIDS and modes of HIV transmission varied from 38.5% to 86%. Totals of 56.4%, 53.9% reported informal education (media and reading materials) and formal education (lecture and health workers) as their main source of information regarding HIV and AIDS. Lack of knowledge regarding risk groups was also apparent as only 10% and 35% identified teachers and truck drivers as occupational risk groups. As in the present study, misconceptions on HIV-related issues have been identified among students elsewhere. Inadequacies with respect to knowledge of infection control practices have been reported among Brazilian dental students (65) and the knowledge about transmission of HIV-infection among health workers in Tamatave has been found to be poor (109). About half

of the investigated Sudanese dental students recognized need for further education regarding HIV and AIDS. In comparison ABOUT 90% OF Japanese dental health care workers requested additional education(48). On the other hand, in a study of dental students in Iran, the majority was found to have excellent HIV and AIDS related knowledge (78.4 %) (52). In the present study, older students were in general more knowledgeable than their younger counterparts. This finding accords with those reported elsewhere suggesting that students' knowledge improves as they progress through their education programs (51). Similar results are reported in South African students (62). Privately funded dental school students reported better knowledge on risk groups and modes of HIV transmission than did their publicly funded dental school student counterparts. These differences might reflect variations in the HIV-related attitudes and behaviors of the private- and public dental faculties. It might also reflect variation in the amount of material, lectures and number of clinical encounters regarding HIV and AIDS that are offered to the students.

4.2.2 Socio-cognitive predictors of dental students' intention to treat HIV – infected patients

As future health care workers the attitudes of medical and dental students towards delivering quality care to HIV infected patients is of particular concern. Effective promotion of quality care requires a thorough understanding of the psycho social determinants of students' care delivery intentions. Progress in explaining and understanding health care workers willingness to care for patients with life threatening diseases (*e.g.* AIDS, SARS) has been impeded by lack of a theoretical approach. Ajzen's

theory of planned behavior, TPB (1), was selected as a theoretical framework because it has been used successfully to predict other professional behaviors (110-113). Moreover, the TPB is valuable when it comes to the identification of psycho social determinants of health and oral health behaviors including the provision of quality care to patients with HIV and AIDS. Social cognition models have been widely used in research on health related behaviors generally (114-116). One of the main advantages of these theoretical frameworks is their usefulness when planning and conducting interventions, for instance educational approaches to the provision of quality care among health care workers, medical and dental students (115, 117). Few studies of HIV related- and other health related behaviors' have applied social cognition models in the context of sub-Saharan Africa.

Some researchers have claimed that social cognition models are most useful when planning interventions to influence health behaviors. Changes in behavioral intentions (and thereby also in behavior) are assumed to be produced by changing existing salient beliefs, making existing non-salient beliefs salient, or creating new salient beliefs (118). Although social cognition models have been widely used to predict and understand a variety of health behaviors (*e.g.* (6, 119), these models have been subject to substantial critique. The strong focus on social cognition factors and the perceived side of social influences may have hampered the research on "realistic" social influence processes. Eakin (120) maintained that in the field of workplace health promotion and occupational health and safety, studies of health behavior emphasize personal determinants rather than the nature of the work environment. Dressler & Oths (121) criticized health behavior

research for neglecting cultural factors and processes and for examining health behaviors narrowly in terms of individual motives and attributions. Thus, a major weakness of the study presented in Paper II, was that other important variables influencing dental students' intention to care for HIV infected patients were not included in the analyses.

In the present study, both Tanzanian and Sudanese students demonstrated a strong intention to provide care for people with HIV and AIDS. Tanzanian students reported on average more positive attitudes, perceived control, moral norms and subjective norms than did their Sudanese counterparts. However, the two student groups differed significantly with respect to socio-demographic characteristics, which, in addition to other not measured variables might have confounded the country differences observed with respect to the TPB constructs. Sudanese students had also significantly less previous experience with HIV and AIDS than their Tanzanian counterparts. Thus, whereas 40.5% of Tanzanian students confirmed previous experience with HIV and AIDS infected patients, this yields only 9% of the Sudanese students. Nevertheless, attitudes and subjective norms were statistically significantly stronger predictors of behavioral intention among Sudanese students as compared to Tanzanian students. In the total sample of students, attitudes was the strongest predictor of intention (beta 0.35) followed in descending order of importance by subjective norms, moral norms and perceived behavioral control. Thus, students' norms in terms of perceiving significant others to support their caring for HIV infected patients and their moral obligations were significantly associated with behavioral intention. This appears to imply that in order to increase students' intention to provide care for HIV infected patients, strengthening

attitudes and norms should be prioritized before modification of perceived behavioral control. This illustrates that the relative importance of TPB in influencing intention might differ according to the target group considered (115). Previous studies have identified perceived behavioral control as for instance the strongest predictor of nurses' intention to care for SARS patients in Taiwan (17). However, other studies have also recognized the contribution of positive attitudes to nurses' intention to care for AIDS patients (14). This study did not identify knowledge as an additional predictor of behavioral intention, although previous AIDS-related studies have shown a weak relationship between knowledge and intention after controlling for the TPB constructs (122). Studies have shown, however, that the provision of HIV related information to improve knowledge might affect attitudes positively(123). According to TPB, the three predictors (attitudes, subjective norms, and perceived control) are to be considered as the primary predictors of intention, although other factors-such as personality, environmental, and demographic variables-may influence behavioral intention. One potential limitation of this study is that subsequent actual performance of oral health care for HIV infected patients was not asked for. However this calls for the collection of longitudinal data which is very difficult and expensive in large scale surveys like the present one. On the other hand, the TPB is also a theory of intention formation and the report of the predictive validity of the theoretical components in this process constitutes the major part of TPB-studies. A review of pertinent literature suggests that measures of intention typically account for 20-40% of the variance in behavior in prospective studies (1).

The AIDS epidemic has had a tremendous impact, not only on the health of the public and health care facilities but also on health workers, including dentists in sub Saharan African countries. The present study adds insight for administrators and educators of dental personnel to further develop strategies to increase dental students' intention to treat HIV infected patients and patients with other fatal contagious diseases. First enhancing positive attitudes and norms might be more important than merely increasing students' HIV related knowledge, although the latter might contribute positively to their attitudes. Second, providing sufficient protective equipments, periodically announcing and practicing infectious control measures and protocols and providing up to date education may help to reinforce dental students perceived control in caring for HIV infected patients.

4.2.3 Use of dental health care services in the Sudan

In paper III we applied Andersen's Behavioral model of Health services uptake (Figure 1) to the explanation of use of oral health care services. According to this model use of health/oral health care services can be explained by a number of contextual and individual factors; predisposing factors, enabling resources and treatment needs (PEN). The interrelationship between those three categories of factors will determine the likelihood of personal use of dental health care services. Various predisposing and enabling factors might alter the use of health care services and the model suggests feedback loops, indicating that outcomes (*e.g.* use of health care services) might affect subsequent predisposing, enabling- and need related characteristics of individuals. Thus, Andersen's model provides a scientific model for explaining oral health related behaviors in terms of individual and social determinants.

To date, the model has been applied in a variety of contexts, including oral health and most notably in the Second International Collaborative Study on Oral health Outcomes (ICSII) (124). This research has provided support to the relationships hypothesized within this model (22). See review of studies provided in (Table 2).

In the study presented in Paper III, predisposing (i.e. socio-demographics) and need-related factors (clinical- and non-clinical oral health indicators) were the strongest predictors of dental care utilization in the total sample, as well as separately among patients attending UST and KDTH. Accordingly, socio-demographics were found to be the most important determinants of dental health care utilization in USA, Burkina Faso and Spain (73, 78, 83, 84). A strong association between need related factors and use of dental health care services has been recognized in many previous studies (24, 71, 74, 76, 82). Others studies have confirmed the enabling factors (income) as the most important determinants of use of dental health care services (24, 125-127). The present results highlighting social inequalities in the use of dental health care among Sudanese patients point to a need for policies aimed at reducing such inequalities (72).

Dental patients from UST reported more frequent use of dental services than those from KDTH. The more frequent use by females might be attributed to the fact that females are more conscious about their appearance and health, Motoi results supports several existing similar survey results such that females are more conscious of their health and have healthier lifestyles than males (128). Again gender difference may also predispose females to different degree and types of dental diseases (129-131). It appears that need

factors are the strongest predictors of dental care use, followed by the enabling and predisposing factors (table 1.2).

Enabling factors in terms of knowledge on HIV-transmission, previous experience with HIV and AIDS, and perceived personal risk as a dental patient associated with use of dental care. Surprisingly, patients who reported good knowledge on HIV transmission tended to use dental care less frequently. This might be attributed to misconceptions regarding how easily one could be infected in dental practices, and may reflect distrust on the part of health workers' in infection control practices. Chiamaka et al (132), suggests that as HIV and AIDS knowledge increases, so do positive feelings and views towards patients with AIDS. The present finding that (132) patients who perceived high infection risk for health workers reported more frequent use of dental care, may also reflect a discrepancy between knowledge and attitudes. There was a high need for dental care with 66% and 55% having bad tooth condition and caries experience (DMFT>0), respectively. This might be seen in light of limited access to dental care in Khartoum. The dentist population ratio in Khartoum state is 1.7: 100 000, whereas in South Africa this ratio is 1:10 649. Other dentist/population ratios, in Mauritius 19:100 000(133), Egypt 14:100000, Jordan 129: 100000, and Lebanon 121:100000 (134).

Paper III showed that the components of Andersen's behavioral model explained 18% and 16% of the variance in dental care utilization of UST and KDTH patients, respectively. Enabling factors contributed independently to the explained variance in use of dental care beyond that of predisposing- and need related factors. Being

knowledgeable about modes of HIV transmission impacted negatively- whereas having positive attitudes towards HIV infected people impacted positively on dental care utilization. This suggests that disparities in dental care utilization of dental patients goes beyond socio-demographic position and need for dental care. Obviously there are other factors outside the remit of this paper, such as dental supply and affordability that might contribute to disparities in dental care utilization patterns. The present findings point to an urgent need for dental professionals and the government to improve public awareness of successful HIV infection control and the confidence placed on competences of dentists in order to minimize avoidance behavior and establish dental health care utilization patterns in this region.

4.3 Conclusions

- Sudanese dental students are not adequately prepared for treating patients with HIV infection and AIDS.
- Sudanese and Tanzanian students' attitudes, subjective norms, moral norms and perceived behavioral control are key factors in students' willingness to treat AIDS and HIV-infected patients.
- The students' showed a strong intention for care delivery in the context of HIV and AIDS across Sudan and Tanzania.

- The students' attitudes, knowledge, subjective norms, and behavioral control are essential in forming their intention.
- Predisposing factors; (females) enabling factors; (positive attitudes towards infected people and high perceived risk of contagion), need related factors (dental caries experience) were strongly associated with dental care utilization. Thus, Disparity in the history of dental care utilization goes beyond socio-demographic position and need for dental care.
- The behavioral models (TPB and Andersen model) are applicable and useful in developing countries is useful.

4.4 Recommendations

- Dental school curriculum in Sudan on regard to HIV-infection needs to be improved, with some considerations on differences between public and private dental schools when planning such improvements.
- Interventions on the training of Sudanese and Tanzanian students should emphasize the importance of Students' HIV-knowledge, attitudes, subjective norms and behavioral control aimed at improving the quality of health care delivery in the context of HIV and AIDS.

- Public awareness of HIV-infection control and confidence on the competence of dentists should be improved to minimize avoidance behavior and help establish quality dental health care service in Sudan.
- Behavioral models should be applied in such and other aspects in oral health to help in better understanding of attitudes and behaviors of oral health personnel and dental patients.

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Research article

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HIV and AIDS related knowledge, sources of information, and reported need for further education among dental students in Sudan- a cross sectional study

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Abstract

Background: Information on the HIV and AIDS-related knowledge among dental students provides a crucial foundation for efforts aimed at developing an appropriate dental curriculum on HIV and AIDS, and for attracting the attention of dental school educators towards the subject.

Purposes: Focusing on a census of dental students attending their 3rd, 4th and 5th study year at publicly – and privately funded dental faculties in Khartoum, this study aimed to assess the prevalence and socio-economic correlates of dental students' knowledge, sources of information and reported need for further education related to HIV and AIDS.

Methods: At the time of the survey (March–May 2007), the total number of dental students registered was 782 of which 642 (response rate 82%, mean age 21.7 year, 72% girls) completed anonymous self-administered questionnaires in supervised class room settings.

Results: A total of 49% and 86% had correct sum scores with respect to knowledge of transmission through contamination and through shaking hands and eating, respectively. About half the dental students recognized a need for further education across HIV related issues, varying from 75% (basic HIV/AIDS related issues) to 84% (patient management). Only 38% of the students had correct sum scores regarding various occupational groups at risk for contacting HIV and AIDS. Multiple logistic regression analysis revealed that compared to privately funded dental school students, publicly funded dental school students were less likely to have correct knowledge about modes of HIV transmission (OR = 0.6) and occupational risk groups (OR = 0.6) and to have received information from lectures/health care workers (OR = 0.5).

Conclusion: Students attending privately funded schools were more knowledgeable about various HIV related issues than students from publicly funded schools. About half of the students investigated had received HIV/AIDS information from various sources and reported need for further education. This suggests that students are not adequately prepared for treating patients with HIV infection and AIDS and that the dental school curriculum needs improvements. Differences between public and private dental schools should be considered when planning such improvements.

Background

Sudan is the largest country in Africa with a prominent diversity in; culture, religion, languages and ethnicity. Being bordered by nine countries, some having a high prevalence of human immunodeficiency virus infection and acquired immunodeficiency syndrome (HIV and AIDS) and having experienced long term ethnical and political conflicts, Sudan is vulnerable for an increase in the prevalence of HIV and AIDS [1]. The first case of HIV and AIDS in Sudan was reported in 1986 and in 2002 the total number of cases reported had increased to 4004 [1]. As in other sub Saharan African countries, the main mode of transmission is heterosexual, accounting for 97% of the HIV positive cases. According to a population based study conducted in 2002, the sero-prevalence was estimated to be 1.6% [1]. Among women attending antenatal clinics, sex workers, prisoners, soldiers, subjects infected with sexually transmitted diseases (STDs) and university students the prevalence of HIV and AIDS has been estimated to vary between 0.5% (soldiers) and 4.4% (sex workers). Moreover, evidence suggests that the HIV and AIDS prevalence among blood donors in Sudan have increased from 0.15% in 1993 to 1.4% in 2000 [1]. Sudan is currently recognised by the World Health Organization, [2] to be a country with an intermediate HIV and AIDS prevalence [1]

It is generally accepted that both dentists and other health care workers should provide quality treatment and care to all individuals indiscriminately [3]. Dentists have a professional and ethical responsibility to provide treatment to patients with HIV and AIDS, particularly since oral lesions, such as hairy leukoplakia, candidiasis and Kaposi's sarcoma, are commonly found in HIV-infected patients [4,5]. Thus, Dental associations (Canadian Dental association, American Dental Association) have issued the recommendations that dentists are obliged to provide quality care for patients with infectious diseases, including HIV and AIDS. Because of the possible transmission of HIV virus through direct contact with blood, the risk for cross-infection comes into particular focus in dental practices [6]. Cross-infection can theoretically take place from patient to patient, from dentist to patient and vice versa. The estimated risk of HIV transmission from general practice dentists to their patients is recognized to be minimal if infection control guidelines are strictly adhered to. About 90% of the HIV infections among health care workers occur in developing countries where occupational safety is a neglected issue [7].

Fear of HIV contagion generates major concerns among health care personnel and may produce a barrier to successful educational efforts about AIDS. This might lead to a variety of adverse outcomes such as unwillingness to treat AIDS patients altogether [8]. Fear about contagion or

AIDS phobia have among other things been attributed to lack of proper knowledge about HIV and its transmission routes [9]. It has been suggested that health care workers are deficient in appropriately managing and counseling HIV and AIDS patients and lack sufficient knowledge of symptoms as well as how to diagnose and treat infected patients appropriately [10,11]. A study among medical students in the United States of America revealed that over half of the students investigated believed that treating AIDS patients might be hazardous and that their education had not prepared them to treat those patients safely [8]. In a study from United Kingdom, dentists demonstrated good knowledge regarding oral lesions associated with HIV and AIDS, but were less familiar with HIV and AIDS transmission routes [12]. Among Tanzanian health care workers inadequate knowledge of treatment procedures related to HIV and AIDS caused reluctance with respect to providing care for HIV-positive patients [13]. Few medical students in Pakistan were found to have accurate knowledge regarding symptoms of HIV and AIDS and modes of HIV transmission, while most of them expressed a need for further education [11]. Similar findings have been reported among Turkish nurses and dentists in Kenya, Brazil, Singapore, South Africa and Iran [14-18]. In Sudan, however, only limited information is available in this area.

Purpose

One major step in preventing a widespread HIV-infection and AIDS epidemic in Sudan is to make certain that dentists are prepared to recognize and treat HIV infected persons and to counsel patients about risks that might lead to infection. Valid knowledge about HIV transmission routes and the HIV epidemiology is important in light of the increasing epidemic and since students are in a process of developing into their subsequent role as dentists in clinical practices. Dental students in Sudan are trained in the epidemiology; the microbiology and pathology (agent, immunology, course and manifestation); and precaution and prevention of HIV during their basic years (1st and 2nd years). In the 3rd, 4th and 5th years students' encounter with HIV patients becomes more apparent. It is upon this background that the present study set out to assess HIV and AIDS related knowledge, sources of HIV and AIDS related information, and perceived need of further education in dental students attending public and private dental schools in Khartoum. Information regarding dental students' HIV-related knowledge provides a crucial foundation for efforts aimed at developing a curriculum that provides clear and consistent information regarding HIV and AIDS and might attract dental school educators' attention to the subject of HIV and AIDS in Sudan.

Methods

Study participants

The present cross-sectional study was carried out in April–May 2007 among a census of dental students attending the 3rd, 4th and 5th study year in 6 dental faculties in Khartoum, the capital of Sudan. A list of all the dental faculties was obtained from the Ministry of Higher Education and lists of all registered students in the 3rd, 4th and 5th years were obtained from all faculties through the Dean's office. The faculties included in this study were publicly and privately funded. Moreover, they represent all available dental faculties in Sudan admitting clinical students and thus include students from all over the country. The total number of dental students registered by the time of the survey was 782 (3rd, 4th and 5th graders) out of which 642 students (response rate 82%, mean age 21.7, 82% girls) completed self-administered, anonymous questionnaires in supervised (by teaching assistants) class-room settings. The main reason for non-participation was absenteeism on the day of the data collection.

Written informed consent was obtained from all participants. A formal ethics waiver was received from the research committee at the University of Science and Technology. All included faculties provided approval letters before conducting the study. Before being used in the field, the questionnaire was reviewed by experienced local researchers, dental academics and health administrators.

Measures

The survey instrument, constructed and administered in English, contained 44 questions regarding HIV and AIDS related knowledge, sources of information and need for further education of dental students. This instrument has been employed previously among university students in East Africa [19]. *Sources of HIV and AIDS related information* were assessed using 6 questions, "How much information about HIV and AIDS related issues have you received from-1) lectures-, 2) radio/TV-, 3) internet-, 4) reading materials-, 5) friends/relatives-, 6) health care workers". Each question had response categories ranging from (1) "very much" to (5) "non at all". For cross tabulation each question was dichotomized into (0) "some/little information received" (original categories 3, 4, 5) and (1) "much/very much information received" (original categories 1, 2). Two formative sum scores were constructed yielding "Amount of information received from reading materials/media" (information received from Radio/TV, internet, reading materials, friends/relatives) and "Amount of information received from lectures/health care workers" (information received from lectures, health workers). For cross tabulation and logistic regression analysis the sum scores were dichotomized based on a median split yielding (1) "very much/much information received from reading materials/media and health care workers" and (0) "some/

little/none information received from reading materials/media and health care workers".

Need for further education

6 questions were applied *in terms of*. "How do you rate your need for further education regarding 1) basic HIV/AIDS related topics, 2) patient management, 3) treatment recommendations, 4) advice on referrals, 5) clinical manifestations, 6) psycho-social complications". Each question had a response category in the range (1) "no need" to (4) "great need". For cross tabulation analysis each question was dichotomized into (1) "moderate/great need" (original categories 3, 4) and (0) "no need" (original categories 1, 2). A formative sum score was constructed based on the 6 questions and labelled "Need for further information on HIV and AIDS". The sum score was dichotomized based on a median split into (1) "moderate to great need" and (0) "slight need/no need" for use in cross tabulation and logistic regression analysis.

Knowledge about modes of HIV and AIDS transmission was assessed using the statements

"HIV and AIDS can be transmitted by 1) using contaminated sharp instruments-, 2) unsafe blood transfusion, 3) contaminated blood transfusion, 4) not transmitted through shaking hands-, 5) not transmitted through eating with infected people". In addition, the students replied to the statement "Condom use is safe prevention". Each statement had response category in the range from (1) "strongly agree" to (5) "strongly disagree". For cross-tabulation each statement was dichotomized yielding (1) = "correct knowledge" (original categories 1, 2) and (0) "incorrect knowledge" (original categories 3, 4, 5). Two sum scores were constructed from 5 variables yielding "Transmission through contaminated instruments" (unsafe blood transfusion, contaminated blood transfusion, contaminated sharp instruments) and "Transmission through shaking hands and eating" (shaking hands, eating). In addition to the one item assessing "Condoms are safe prevention". The two sum scores were dichotomized on a median split into (1) = "Correct overall knowledge" and (0) "Incorrect overall knowledge".

Knowledge of risk groups for HIV and AIDS, was assessed using 6 statements with response scale (1) "correct", (0) "incorrect". The students were asked "Is it correct or incorrect that university students, barbers, truck drivers, soldiers, teachers and health care workers are considered as high risk groups by profession"? One formative sum score was constructed from the 6 variables. For logistic regression analysis the sum score was dichotomized based on a median split into (1) "Correct knowledge on occupational risk groups", (0) "Incorrect knowledge on occupational risk groups"

Statistical procedure

Data were analyzed using the Statistical Packages for Social Sciences (SPSS), version 15. Differences between students from public and private institutions were analyzed using cross-tabulation and Pearson's chi-squared test. Multivariate analysis was conducted by multiple logistic regression analysis with odds ratio (OR) and 95% Confidence Interval (CI). P-value for statistical significance was set to 0.05.

Results

Characteristics of participants

A total of 642 students (mean age 21.7 yr, 72% females) 48.6% attending publicly funded and 51.4% attending privately funded dental schools in Khartoum (3rd, 4th, 5th year of study) participated in the study. The response rate was 82%. A total of 32.7% and 23.1% ($p < 0.001$) of students attending respectively, private and public dental schools were males, whereas 42.2% of public dental school students and 59.1% of the private dental school students were in the older age group of 22–30 year ($p < 0.001$). Compared to the public dental schools, the private schools had a higher proportion of students who were smokers and who lived outside Sudan ($p < 0.05$). Table 1 gives the percentage distribution of participants' socio-demographic characteristics in public and private dental schools in Khartoum.

HIV and AIDS information received from various sources

Lectures and Radio/TV were the most frequently reported sources of information related to HIV and AIDS as reported by 61% and 44% of the students, whereas information from friends/relatives (31%) and health care workers (39%) were less frequently reported. As shown in Table 2, public dental students reported more frequently to have received information from Radio/TV (63% versus

44%), whereas private dental students reported more frequently than public dental students to have received information from lectures (67% versus 53%). Private dental students reported more often than their public dental student counterparts that they had received much and very much information from lectures/health care workers (63% versus 44.6%, $p < 0.001$) (Table 2).

Perceived need for further education

About half of the students, 47.6%, confirmed a moderate to high need for further education across topics related to HIV and AIDS (Table 2). Substantial proportions of students wanted to know more about the management of HIV infected patients (84%), clinical manifestations (81%), psycho social complications (80%), treatment recommendations (79%) and basic HIV and AIDS issues (75%). Statistically significantly higher proportions of students from public dental schools than from private dental schools reported need for further education regarding basic HIV and AIDS issues, patient management, treatment recommendations, advice referrals and clinical manifestations ($p < 0.05$) (Table 2).

Knowledge regarding people at risk for HIV and AIDS

Substantial proportions of students from both public- and private dental schools classified correctly across various occupational groups at risk for getting HIV -infection (38.5%) (Table 3). Health workers (79.1%) and barbers (74.5%) were the risk groups most frequently recognized, whereas teachers (10.7%) and truck drivers (35.9%) were less frequently recognized as risk groups in this context. Knowledge about risk groups varied across institutions with higher proportions of private dental school students than public dental school students classifying correctly university students, truck drivers and teachers as occupational risk groups.

Table 1: Sample profile: Percentage distribution (n) of students' socio-demographic characteristics in public and private educational institutions.

	Public university % (n)	Private university % (n)	Total % (n)
Female	76.9 (240)	67.3 (216)**	72.0 (456)
Male	23.1 (72)	32.7 (105)*	28.0 (177)
18–21 yr	57.8 (178)	40.8 (131)	49.1 (309)
22–30 yr	42.2 (130)	59.2(190)**	50.9 (320)
Father's education-low	21.7 (67)	16.0 (52)	18.8 (119)
Father's education-high	77.6 (242)	82.7 (273)	80.2 (515)
Mother's education – low	56.5 (174)	49.5 (160)	52.9 (334)
Mother's education- high	45.6 (134)	51.6 (163)	48.7 (297)
Smoking ever- no	92.6 (289)	79.5 (260)	85.9 (549)
Smoking ever -yes	7.4 (23)	20.5 (67)**	14.1 (90)
Living in Khartoum	58.0 (181)	45.9 (151)	51.8 (332)
Living outside Sudan	42.0 (131)	54.1 (178)*	48.2 (309)

** $p < 0.001$

* $p < 0.05$

Table 2: HIV/AIDS related information received from various sources and need for further education by type of university.

Sources of information	Public university % (n)	Private university % (n)	Total % (n)
Lectures	53.8 (168)	67.8 (221)**	61.0 (389)
Radio/TV	50.0 (156)	38.4 (126)*	44.1 (282)
Internet	28.6 (89)	36.6 (119)*	32.7 (208)
Reading materials	34.5 (107)	35.6 (116)	35.1 (223)
Friends/relatives	29.8 (93)	32.8 (107)	31.3 (200)
Health care workers	33.3 (104)	45.1 (147)*	39.3 (251)
Sum score: Information from media/reading	54.2 (165)	59.4 (193)	56.4 (358)
Sum score: Information from lectures/health care workers	44.6 (139)	63.0 (204)**	53.9 (323)
Need for further education			
Basic HIV/AIDS issues	81.1 (249)	70.9 (232)*	75.9 (481)
Patient management	88.1 (274)	80.4 (263)*	84.2 (537)
Treatment recommendations	85.3 (262)	74.8 (243)*	79.9 (505)
Advice on referrals	81.2 (250)	72.4 (236)*	76.7 (486)
Clinical manifestations	86.1 (267)	77.9 (254)*	81.9 (521)
Psycho-social complications	83.2 (258)	78.2 (254)	80.6 (512)
Sum score: need for further information-	48.2 (145)	47.0 (151)	47.6 (296)

Percentages (n) of those who confirmed much/very much information received and moderate/great need for further information.

** p < 0.001, * p < 0.05

Knowledge of HIV transmission modes

A majority of students had accurate knowledge regarding modes of transmission with the proportions answering each question correctly varying between 85% (do not transmit by shaking hands) and 97% (transmission through contaminated blood transfusion). About half the students recognized condom use as a safe method of preventing transmission of HIV. Knowledge of modes of transmission did not vary statistically significantly differ between students attending public- and private dental

schools. Good overall knowledge about transmission through contaminated instruments (sum score) was more frequently reported by private dental school students than by their public counterparts (53.8% versus 43.9%, p < 0.05) (Table 3).

Socio-demographic correlates of indicators related to information and knowledge of HIV/AIDS

To control for possible effect of confounding, all sum scores were regressed on several socio-demographic fac-

Table 3: Knowledge about HIV related issues versus type of university. Percentage (n) of those who replied correctly to the various items

	Public % (n)	Private % (n)	Total % (n)
Risk groups			
University students	48.9 (152)	64.2 (210)**	56.7 (362)
Berbers	75.5 (234)	73.5 (239)	74.5 (473)
Truck drivers	24.8 (77)	46.5 (152)**	35.9 (229)
Soldiers	64.2 (199)	63.5 (207)	63.8 (406)
Teachers	6.4 (20)	14.7 (48)*	10.7 (68)
Health workers	87.4 (271) **	71.3 (233)	79.1 (504)
Sum score: Knowledge of risk groups	30.7 (95)	46.0 (149)**	38.5 (244)
Modes of transmission			
Condom safe prevention	46.9 (146)	53.0 (174)	50.1 (320)
HIV/AIDS transmits by unsafe blood transfusion	95.8 (299)	96.3 (316)	96.1 (615)
HIV/AIDS transmit by contaminated blood transfusion	97.4 (304)	97.0 (318)	97.2 (622)
----- transmits by contaminated sharp instruments	93.9 (293)	93.9 (307)	93.9 (600)
----do not transmit by shaking hands with infected persons	88.1 (275)	83.1 (271)	85.6 (546)
-----do not transmit by eating with infected persons	90.1 (281)	85.6 (280)	87.8 (561)
Sum score: Transmission through contaminated instruments	43.9 (137)	53.8 (176)*	49.0 (313)
Sum score: Transmission through shaking hands/eating	43.6 (278)	43.5 (275)	86.6 (553)

** p < 0.001

* p < 0.05

tors in terms of type of educational institution, gender, age, place of living and parents' education. As shown in Table 4, compared to being a private dental school student and having a father with high education, public dental school students and students having fathers with low education had reduced odds (OR = 0.6) for reporting good knowledge regarding HIV transmission through contaminated instruments. Public dental school students and younger age groups were less likely than their counterparts in the opposite groups to report information received from health care workers/lectures (OR = 0.5) and to have good knowledge on HIV and AIDS related occupational risk groups (OR = 0.6). Sum scores regarding information received from media/reading material, perceived need for further information, and HIV and AIDS transmission through handshaking and eating did not vary statistically significantly with any of the socio-demographic characteristics measured in this study.

Discussion

The present study is the first to assess detailed knowledge regarding the modes of transmission of HIV-infection, related aspects of infection control, sources of HIV information and perceived need for further education regarding HIV and AIDS among Sudanese dental students. The findings are believed to be representative for dental students attending 3rd, 4th and 5th study year in Sudan since a census of available dental schools in Sudan was considered with a high response rate. The study group targeted represents a restricted range of adults regarding age and socio-economic background making it less probably that social inequalities have contributed largely to the pattern of results. On the other hand, universities might vary regarding their format of instructions and in their atmosphere. Thus, universities vary regarding the type of students they attract. This was apparent in that public dental schools tended to have more female students and fewer

smokers than the private dental schools. In addition, private dental schools encompassed older students living outside Sudan probably reflecting the higher socioeconomic status necessary of being in the position to attend private universities. In accordance with the demography of all higher educational institutions in Sudan, a larger proportion of females than males participated in the present study, reflecting the general progress in girls' education going on in this country.

As shown in Table 3, the present results suggest that dental students who should be aware of the latest information regarding HIV and AIDS demonstrated moderate to good overall knowledge with proportions having correct sum scores on occupational risk groups, transmission through contamination and transmission through shaking hand and eating ranging from 38% to 86%. Moreover, the percentages having correct knowledge varied from 35% (truck drivers as occupational risk groups) to 97% (transmission through contaminated blood transfusion). These figures show little difference from those obtained regarding the knowledge level in the general population of 15–24-year-olds from various countries, suggesting that about 50% have serious misconceptions regarding HIV transmission. Lack of knowledge was also apparent among the Sudanese dental students in that only 10% and 35% of students correctly classified teachers and truck drivers as occupational risk groups. Similar proportions of subjects having misconceptions with respect to HIV related issues have been identified in previous studies from industrialized as well as non-industrialized countries [12,15,17,18,20,21]. On the other hand, Brook [22] found relatively sufficient knowledge about transmission routes and high-risk group among Israeli high school students. It should be noted that knowledge of the risk of being infected with HIV attributed to occupational groups, such as teachers and health care workers are sel-

Table 4: Socio-demographic factors associated with knowledge of transmission, amount of information received and knowledge on occupational risk groups Odds ratios (OR) and 95% confidence interval (CI).

	Transmission contaminated instruments	Information received/health workers/ lectures	Occupational risk groups
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Private institution	1	1	1
Public institution	0.6 (0.4–0.9)	0.5 (0.3–0.7)	0.6 (0.4–0.8)
Male	1	1	1
Female	1.2 (0.8–1.7)	1.2 (0.8–1.7)	1.0 (0.7–1.5)
22–30 yr (older)	1	1	1
18–21 yr (younger)	1.1 (0.7–1.5)	0.6 (0.4–0.8)	0.6 (0.4–0.8)
Father's education – high	1	1	1
Father's education low	0.6 (0.4–0.9)	1.1 (0.7–1.7)	0.7 (0.4–1.1)
Mother's education- high	1	1	1
Mother's education – low	1.5 (1.1–2.1)	1.0 (0.7–1.4)	0.9 (0.6–1.3)
Living in Khartoum	1	1	1
Living outside Sudan	1.3 (0.9–1.8)	0.8 (0.6–1.2)	0.7 (0.5–1.0)

dom certain. Thus, there is disagreement among experts as to the relative importance of those groups when it comes to their susceptibility for infection. Such disagreement might explain differences in terms of private school students rating the vulnerability of university students, truck drivers and teachers higher than did their public dental student counterparts, whereas public dental school students rated the vulnerability of health care workers higher than did private dental school students.

The observation that a substantial proportion of the participants (79%) were concerned about the risk status of health care workers might reflect a fear of contagion among dental students. Previous studies have suggested that between 26% and 90% of students of medical subjects are concerned about HIV transmission from patients [8]. It is evident that students' beliefs that working with AIDS patients endangers their health might develop into an unwillingness to treat AIDS patients altogether [23]. Generally, knowledge about HIV infection is recognized as a critical component for the control and management of this disease [24]. Several authors have attributed fear of contagion to inadequate HIV and AIDS related knowledge, whereas others have demonstrated a reduction in fears through improved AIDS education [11,25]. Apparently, there is a need for better professional education concerning HIV and AIDS among health care workers throughout the world. Proper training in medical and psychological aspects of treating HIV positive patients has been recognized as an effective method to change the attitudes towards HIV and AIDS among dental health care workers [25,26]. Evaluations of public educational programs in developed- and developing countries dealing with prejudice reveal that the media images of the epidemic gradually become more positive and informative leading to a gradual shift in attitudes among health care workers.

Although a majority of the Sudanese dental students were aware of the common transmission routes for HIV infection, their knowledge was less accurate with respect to other HIV- and AIDS related topics. About half of the students investigated reported need for continued education considering HIV and AIDS and admitted having received much information on from media/reading material and lectures/health care workers (Table 2). The consistency of the present findings suggest that Sudanese dental students might be less well prepared for the task of treating patients with HIV infection and AIDS and that the dental school curriculum regarding HIV and AIDS needs some improvements. The finding that between 75% (basic HIV related issues) and 81% (clinical manifestations and psychosocial complications) of the participants reported a need for further education also suggests a recognition made by them of AIDS being a threat to the Sudanese society. These

findings are similar to those reported by American and European investigators one decade ago when the AIDS epidemic was emerging [27]. Consistent findings have also been reported previously in studies from developed and developing countries [17,18,23,28]. A recent study of dentists in Kenya revealed that the majority reported having a need for further HIV and AIDS education [16].

Lectures (61%), media (44%) and health care workers (39%) were the most frequently reported sources of HIV information among both public and private dental students. The sources of AIDS information reported in this study are similar to those identified previously among dental health care workers from Europe, USA, Japan and Iran, as well as in students of medical subjects from Iran and Pakistan [14,26]. The present results are in contrast to a study of Japanese dental health care workers where TV and newspapers were cited as the most common source of AIDS related knowledge [26]. Sudanese dental students rating TV and Radio as a less common AIDS informational sources this has to be viewed in light of how this topic has been evaluated by the Sudanese national media. Recognized as sensitive sexually related issues, Sudanese media has not yet been in favor of public educational campaigns considering HIV and AIDS [29]. Dental health care workers in Netherlands and Italy cited scientific journals and continuing educational courses as their most important source of HIV related information. In contrast, Sudanese dental students reported dental reading materials as a relatively less common source of information thus highlighting a deficiency in their current education curricula concerning HIV and AIDS.

Analyzing all sum scores of HIV-related knowledge according to demographic covariates in multiple logistic regression analyses made it possible to control for confounding influences and to identify the independent effect of each socio-demographic factor. Notably, both in univariate- and multivariate analyses there was a consistent trend of public dental students showing less accurate knowledge about HIV and AIDS related issues than their private dental student counterparts. This reflects the existence of a social gradient among students attending different parts of the Sudanese educational system. Compared to public dental students, private students were mainly older, included lower proportions of women and higher proportions of subjects that were living outside Sudan indicating the higher socio-economic status needed to be able to attend privately funded and governed universities. As compared to students attending private institutions and having father's of high education, students from public dental institutions and those having father's with low education were less likely to be knowledgeable about modes of HIV transmission. Moreover, public dental students tended to be less likely to have received information

from health workers and lectures and to be knowledgeable about risk groups. These differences might reflect variations in the HIV related attitudes and behaviors of the private- and public dental faculties as well as variation in the amount of material, lectures and number of clinical encounters regarding HIV and AIDS that are offered to students. The trend of younger students having less accurate knowledge than their older counterparts across HIV related issues corroborate previous findings among Pakistani medical students and suggests that students' knowledge level improves as they progress through their education programs [11].

The results of the present study should be interpreted with caution since it is limited by the use of self-administered questionnaires and not by interviews which are most commonly used in non-occidental settings and by the inclusion of students volunteering to participate. It might be argued, however, that anonymous self reports is more reliable than interview data in that the respondents are less prone to the pressures of social demand emanating from conversation face to face with a research assistant [30]. Moreover, the questions employed were sufficiently simple and unambiguous to achieve a reasonable degree of validity on the different variables. In fact previous researches have found such self-reports to be quite reliable.

Conclusion

The results of the present study revealed that Sudanese dental students have deficiencies with respect to their knowledge and amount of information received on HIV and AIDS related topics. This deficiency was more frequently observed in public dental students than in their private dental student counterparts. The results indicate that dental students in Sudan are less well prepared for their future task of treating patients with HIV infection and AIDS and highlight a need for improving the dental school curriculum regarding HIV and AIDS. Dental school based differences in terms of privately and publicly funded schools should be considered when planning improvements in the HIV and AIDS curriculum. Thus, the present findings might serve as a wake up call for dental program directors to explore further how well graduating students in the different institutions are prepared to treat patients at risk of or infected with HIV and AIDS. Dental students' interest in this topic, as revealed by their recognition of a need for further education reflects a susceptibility for change that should be both supportive and encouraging for dental educators in their efforts towards improving dental education on HIV and AIDS related topics in Sudan

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

EFN: principle investigator, conceived of the study, designed the study, collected data, performed statistical analyses and manuscript writing. ANA: main supervisor, guided the design of the study and has been actively involved in statistical analyses of data and in manuscript writing. JD: co-supervisor, has been actively involved in statistical analyses and paper writing. RWA: co-supervisor, has provided valuable comments on the paper in general and has been actively involved in manuscript writing. All authors read and approved the final manuscript.

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Research article

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Predicting intention to treat HIV-infected patients among Tanzanian and Sudanese medical and dental students using the theory of planned behaviour - a cross sectional study

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Abstract

Background: The HIV epidemic poses significant challenges to the low income countries in sub Saharan Africa (SSA), affecting the attrition rate among health care workers, their level of motivation, and absenteeism from work. Little is known about how to deal with deterioration of human resources in the health care systems. This study aimed to predict the intention to provide surgical treatment to HIV infected patients among medical- and dental students in Tanzania and Sudan using an extended version of the Theory of Planned Behaviour (TPB).

Methods: Four hundred and seventy five medical- and dental students at the University of Dar es Salaam (mean age, 25 yr) and 642 dental students attending 6 public and private dental faculties in Khartoum (mean age 21.7 yr) completed self-administered TPB questionnaires in 2005 and 2007, respectively.

Results: Both Tanzanian and Sudanese students demonstrated strong intentions to provide care for people with HIV and AIDS. Stepwise linear regression revealed that the TPB accounted for 51% (43% in Tanzania and Sudan) of the variance in intention across study sites. After having controlled for country and past behaviour, the TPB in terms of attitudes, subjective norms and perceived behavioural control accounted for 34% and moral norms for an additional 2,3% of the explainable variance in intention. Across both study sites, attitudes were the strongest predictor of intention followed in descending order by subjective norms, moral norms and perceived behavioural control.

Conclusion: The TPB is applicable to students' care delivery intentions in the context of HIV and AIDS across the two SSA countries investigated. It is suggested that attitudes, subjective norms, moral norms and perceived behavioural control are key factors in students' willingness to treat AIDS and HIV infected patients and should be targets of interventions aimed at improving the quality of health care delivery in this context.

Background

An estimated 22 million people were living with HIV and AIDS in sub-Saharan Africa, SSA, at the end of 2007 [1].

The United Republic of Tanzania had an estimated 1.6 million people living with HIV and AIDS as of the end of 2003 [1]. Sudan, the biggest country of the SSA continent,

is currently recognized by the World Health Organization to suffer an intermediate HIV and AIDS prevalence of 1.6% [1]. The HIV epidemic poses significant development challenges to the low income countries in SSA [2]. It affects the attrition rate among health care workers, their level of motivation, professional practices and absenteeism from work [2]. To date, little is known about how to deal with the deterioration of human resources in the health care systems.

Due to the method of transmission of HIV virus through direct contact with blood, the risk for cross-infection comes into particular focus in medical and dental practices [3]. Over 90% of the HIV infections occurring among health care workers annually stem from developing countries where occupational safety is a neglected issue [4]. Although the risk of transmission in health care settings has been recognized to be low, fear of illness, contagion and death has influenced health workers' attitudes and thus the quality of care provided towards patients with HIV [5-7]. Increased personal risk, lack of necessary skills, knowledge gaps, difficulties in dealing with staff worries and concern about losing other patients are the most frequent complaints [8-12]. A recent publication focusing on dental students in Khartoum, Sudan, revealed that half of the participants reported a need for further education across HIV and AIDS related issues, suggesting they are not adequately prepared for treating HIV infected patients [8]. Unacceptable knowledge and practice as well as gaps in the availability and access to policies and protocols on the part of health care workers have been observed in several sub-Saharan African countries [11,13-17]. According to the World Health Organization (WHO), dentists have a professional and ethical responsibility to treat patients with HIV and AIDS [18-20]. The importance of training dental and medical staff to provide health care to HIV infected patients at the same level as non-infected people have been widely recognized [17,19]. As future health care workers, the attitudes of dental and medical students towards delivering high quality care for HIV infected patients are of particular concern. Effective promotion of quality health care delivery in the context of HIV and AIDS requires a thorough understanding of the psychosocial determinants of students' intention to provide care to HIV infected patients. Ajzen's theory of planned behaviour (TPB) is a valuable model for identifying the determinants of health behaviours, including quality health care provision for patients with HIV and AIDS [21].

Theoretical approach

The TPB [21] constitutes a promising framework for understanding and predicting social behaviours (Figure 1). The TPB includes perceived behavioural control on a level with attitude and subjective norm as predictors of behavioural intention. This theory implies that the three

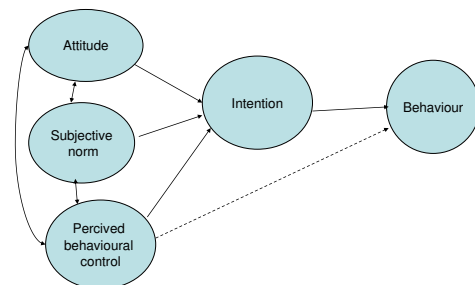


Figure 1
The theory of planned behaviour (Ajzen 1991).

predictors influence subsequent behaviour indirectly through behavioural intention. The TPB posits that behavioural intention is a function of attitude, reflecting a favourable or unfavourable evaluation of the particular behaviour and subjective norm, referring to the perceived social pressure to perform the behaviour. Perceived behavioural control reflects the ease or difficulty associated with performance. Attitudes, subjective norms and perceived behavioural control are underpinned by behavioural, normative and control beliefs, respectively. A number of studies have suggested that past behaviour has a residual effect on behavioural intention after the TPB has been taken into account [22,23]. Thus, Ajzen [21] suggested that the TPB is open to the inclusion of additional variables if it can be shown that they capture a significant proportion of the outcome variance.

The TPB has been applied successfully to a range of domains, including HIV related behaviours, particularly condom use [24-28]. With respect to occupational behaviour, the TPB has predicted health workers' use of gloves, their intention to provide home-care for HIV infected patients, their adherence to universal precautions for venipuncture and their intention to provide professional labour support [29-33]. The TPB has been used previously in sub-Saharan African settings to predict HIV protective behaviours, however mostly by small scale studies [27]. It has been advocated that the applicability of socio-cognitive models to the African context should be systematically addressed considering the need for theory-based research in the planning of effective HIV and AIDS related educational programs [34,35].

This study extends analyses of external variables within the TPB in the context of health care delivery by adding past behaviour and moral norms from Triandis' Theory of Interpersonal Behaviour [36]. Personal normative belief or moral norms represents a measure of the personal feel-

ings of moral obligations or responsibility to perform or refuse to perform a given behaviour. Studies of moral norms in the context of the TPB were reviewed by Conner and Armitage [24] who estimated that across investigations moral norms predicted an additional 4% of the variance in intention after controlling for the TPB. Moreover, studies on the Theory of Interpersonal Behaviour have consistently shown that moral considerations are significant predictors of behavioural intentions in the presence of the TPB [37]. Focusing on medical and dental students from Tanzania and Sudan, this study aims to predict the intention to provide surgical treatment to patients with HIV and AIDS as part of future professional work, using the TPB and moral norms. The hypotheses of the present study were:

-attitudes, subjective norms and perceived behavioural control will each contribute positively and statistically significantly to the prediction of intention to provide surgery treatment to HIV and AIDS infected patients

-moral norms will add significantly to the prediction of behavioural intention over and above the TPB

Methods

Tanzanian Study group

A cross-sectional survey was carried out from June to September 2005 at Muhimbili University College of Health and Allied Sciences (MUHAS) at the University of Dar-es-Salaam. The target population consisted of students attending the faculties of dentistry and medicine. A total of 1,021 (862 medical and 159 dental) students were enrolled at the college in 2005. Six hundred students (100 students in each study year) attending the 1st to the 5th study year were invited to participate. A total of 476 students agreed to participate and 454 students (response rate 75.6%), mean age 25.6 (sd 2.6), 22.5% females completed supervised self-administered structured questionnaires at the faculty in class-room settings.

Sudanese Study group

A cross-sectional study was carried out from April to May 2007 among a census of dental students attending dental faculties in Khartoum, the capital city of Sudan. A list of all the dental faculties was obtained from the Ministry of Higher Education and lists of all registered students in their 3rd, 4th and 5th years were obtained from all faculties through the Dean's office. The faculties included in this study were both publicly and privately funded. Moreover, they represented all available dental faculties in Sudan, making potentiating admission from all over the country. The total number of dental students registered by the time of the survey was 782 out of which 642 students (response rate 82%), mean age 21.7, (sd 1.9), 82% females completed self-administered, anonymous questionnaires in

supervised (by teaching assistants) class-room settings. The main reason for non-participation was absenteeism on the day of the data collection. More information regarding the sampling, recruitment and data collection is available in a previous publication [8].

Ethical clearance

Written informed consent was obtained from all participants in both countries. A formal ethics waiver was received from the research committee at the University of Science and Technology in Sudan, the Research Committee at MUHAS, Tanzania and from the Regional research committee of Norway (REK VEST).

Survey instrument

Identical survey instruments were used at both sites. Before administration in the field, the questionnaire was reviewed by experienced local researchers, dental academics and health administrators. The survey instrument was adapted from instruments previously employed in SSA [38]. In Tanzania, the survey instrument was constructed and completed in English. In Sudan, the survey instrument was constructed in English, translated into Arabic (the Sudanese national language) and then back translated into English by independent language experts. The survey instrument covered socio-demographic factors and each component of the TPB developed according to the guidelines proposed by Ajzen and Fishbein [39].

Variables and measurements

Intention to provide surgical treatment to patients infected with HIV/AIDS as part of future professional work was measured by three items. E.g. "How likely is it that you will provide-----". The respondents indicated their subjective probability along a five point response scale from (1) very unlikely to (5) very likely. A sum score was constructed from the three items.

Attitudes- were measured by 5 items, three positively worded and two negatively worded. Responses were recorded on a five-point scale ranging from (1) strongly disagree to (5) strongly agree. A sum score was constructed after positively worded items were reversibly scored.

Subjective norms were measured by 4 items in relation to all my patients, community leaders, my family and my teacher at the college. E.g. "My teacher at my college wants me to provide surgical treatment to HIV and AIDS infected patients as part of future professional work". Responses were indicated on five-point scales ranging from (1) strongly disagree to (5) strongly agree. A sum score was constructed from the 4 items.

Perceived behavioural control was assessed using one item, "How easy or difficult is it for you to provide surgical treatment to patients infected with HIV and AIDS as part of future professional work? Responses were rated on a scale ranging from (1) very difficult to (5) very easy.

Moral norms were assessed using 3 items "I feel guilty if I do not provide -----". "I get a bad conscience if I do not provide surgical treatment and "It is morally wrong for me not to provide surgical treatment ". Responses were indicated on a scale ranging from (1) strongly disagree to (5) strongly agree. A sum score was constructed from the 3 items.

Past behaviour was assessed using a dummy variable in terms of "Have you ever participated in the clinical treatment of HIV and/AIDS infected patients". Answers were provided as (1) yes and (0) no.

Statistical methods

Confirmatory factor analysis, CFA, with AMOS 16 was employed to test the hypothesized measurement model with respect to intention, attitudes, subjective norms and moral norms, specifying the relationship between the observed variables (indicators) and the underlying latent variables (concepts). Thus CFA was used to test whether the Tanzanian and Sudanese data were consistent with an a priori hypothesized 4-factor model. The parameters of the model were estimated with maximum likelihood (ML) estimation. Missing data were assumed to be missing at random and was handled using the direct approach in AMOS 16 [40].

The adequacy of overall model fit was estimated using chi-square test statistics and the following supplemental fit indices, root-mean-squared error of approximation (RMSEA), the comparative fit index (CFI) and Akaike's information criteria, AIC. In line with the conventional recommendations of Hu and Bentler [41], a good model fit was indicated by a RMSEA less or equal to .06, a CFI greater or equal to .90 and with models having lower AIC being more plausible. The statistical significance of parameter estimates are the critical ratio (CR) representing the parameter estimate divided by its standard error. Based on a level of 0.05, the test statistics need to be $\leq \pm 1.96$ before the null hypothesis can be rejected. All other analyses were performed using SPSS 15.0 (SPSS, Inc, Chicago, Illinois, USA). Internal consistency reliability of and bivariate associations among the theoretical constructs were assessed using Cronbach's alpha and Pearson's correlation coefficients, respectively. Unadjusted and adjusted marginal means and 95% confidence intervals for the components of the TPB and the construct of moral norm were estimated using General Linear Models, GLM (ANOVA). Linear multiple regression analysis was applied

to predict intention from the TPB and external variables. The effect of the independent variables were expressed in terms of standardized regression coefficients (betas) and tested for statistical significance by means of F-test. The fit of the model was reported in terms of the squared multiple correlation coefficient (R^2).

Results

Sample characteristics

Of the 475 Tanzanian students, 17% were in the younger age group (below or equal to 22 yr), 77.5% (368) were males, and 25.4% (121) were in their 5th study year. The corresponding figures pertaining to the Sudanese participants were 69.6% (438), 28% (177) and 36% (231), respectively. Table 1 depicts the percentage distribution of participants according to socio-demographics and country of residence. All socio-demographic characteristics varied substantially and statistically significantly across the two cultures considered.

Measurement model for the extended TPB

CFA indicated that an initially proposed 4-factor model specified for the extended TPB questionnaire was not an acceptable fit on any indices employed, neither with the Tanzanian ($\chi^2 = 308,057$, $df = 84$, CFI = 0.91, RMSEA = 0.07, AIC = 380.0) nor with the Sudanese data ($\chi^2 = 351,398$, $df = 84$, CFI = 0.89, RMSEA = 0.07, AIC = 453.3). Modification indices indicated some specified error terms to co-vary and two cross loading from subjective norms and moral norms to indicators of intention. Re-running the model with the above suggested modifications indicated acceptable fit for the Tanzanian ($\chi^2 = 191,735$ $df = 79$, CFI = 0.96, RMSEA = 0.05, AIC = 273.7) as well as to the Sudanese data ($\chi^2 = 281,058$, $df = 83$, CFI = 0.92, RMSEA = 0.06, AIC = 385.0). All factor loadings (standardized regression weights) were in the expected direction and were statistically significant at $CR > 1.96$, with inter-factor correlations ranging from 0.46-0.78 (Tanzania) and from 0.50-0.68 (Sudan). Thus, all inter-factor correlations were below the threshold of 0.80 which is set as cut off to indicate poor discriminative validity [41].

Descriptive statistics

Table 2 depicts unadjusted and adjusted marginal means and 95% confidence intervals for the components of the TPB and the construct of moral norm by country of residence. Country differences were estimated after controlling for potential confounding effect from socio-demographic variables (age, gender, parental education, study year) using General Linear Models, GLM (ANOVA). In both countries, students had on average positive attitudes, strong moral norms and strong intentions regarding care delivery to patients with HIV and AIDS. Both groups of students had on average moderately strong subjective norms and perceived less control regarding this

Table 1: Percentage distribution (n) of participating students by socio-demographic characteristics and country.

	Tanzania	Sudan
	% (n)	% (n)
Age		
Younger ≤ 22 yr	17.1 (79)	69.6 (438)
Older >22 yr	82.9 (383)	30.4 (191)**
Sex		
Male	77.5 (8368)	28.0 (177)
Female	22.5 (107)	72.0 (456)**
Father's education		
Low (below university)	52.6 (246)	18.8 (119)
High (university)	47.4 (222)	81.2 (514)**
Mother's education		
Low (below university)	71.4 (330)	52.9 (334)
High (university)	28.6 (132)	47.1 (297)
Year of study		
1 st - 4 th study year	74.6 (355)	64.0 (410)
5 th study years	25.4 (121)	36.0 (231)**
Preferred future workplace		
Urban	78.5 (365)	86.7 (540)
Rural	21.5 (100)	13.3 (83)**
Past experience care to HIV infected patients		
No	59.5 (270)	90.9 (501)
Yes	40.5 (184)	9.1 (50)**

**p < 0.001 *p < 0.05

behaviour. Tanzanian students had on average more positive attitudes and stronger intentions, perceived control, moral norms and subjective norms compared to their Sudanese counterparts. Internal consistency reliability in terms of Cronbach's alpha ranged from 0.83 (moral norms/subjective norms) to 0.44 (attitudes) in Tanzania and from 0.81 (attitudes/intention) to 0.45 (subjective norms) in Sudan.

Prediction of intention to provide surgical treatment to patients with HIV and AIDS as part of future professional work

In Tanzanian and Sudanese students, the TPB components, moral norms, and past behaviour were statistically significantly associated with intention. In Tanzanian students, Pearson's correlation coefficients ranged from r = .52 between attitudes and intention to r = .14 between past behaviour and intention. In Sudanese students, Pearson's correlation ranged from r = .54 between intention

Table 2: Unadjusted (sd) and adjusted estimated marginal means (95% CI) and Cronbach's alpha for the TPB constructs and moral norms according to country.

	Tanzania			Sudan		
Tanzania	Mean (sd) [Range] ^a	Mean (95% CI) [Range] ^b	Cronbach's alpha	Mean (sd) [Range] ^a	Mean (95% CI) [range] ^b	Cronbach's alpha
Attitudes (5 item)	18.9 (2.8) [9-25]	19.2 (18.8-19.5)** [9-25]	0.44	16.1 (2.7) [5-24]	16.0 (15.6-16.3**) [5-25]	0.81
Subjective norms (5 items)	14.5 (3.2) [4-20]	14.6 (14.0-14.8)** [4-20]	0.83	12.5 (2.7) [4-19]	12.5 (12.2-12.9) [4-19]	0.45
Moral norms (3 items)	11.7 (2.6) [3-15]	11.8 (11.5-12.1)** [3-15]	0.83	10.6 (2.8) [3-15]	11.0 (10.6-11.3) [3-15]	0.60
Perceived control (1 item)	3.2 (1.1) [1-5]	3.2 (3.1-3.3)** [1-5]	-	2.4 (1.0) [1-5]	2.6 (2.4-2.6) [1-5]	
Intention (3 items)	12.2 (2.2) [3-15]	12.3 (12.0-12.6)** [3-15]	0.82	10.0 (2.9) [3-15]	10.3 (9.9-10.6) [3-15]	0.81

^a Unadjusted means

^b Adjusted for age, gender, parental education and study year

and attitudes to $r = .03$ between intention and past behaviour.

Table 3 depicts the results from hierarchical linear regression analysis assessing the fit of the extended TPB model among Tanzanian and Sudanese students. Country and past behaviour were entered in the first step explaining 15.7% (R^2 change = 0.157, $p < 0.001$) of the variance in intention. Adding attitudes, subjective norms and perceived behavioural control in step 2 increased the explained variance by 33.4% (R^2 change = 0.334 $p < 0.001$). Moral norm added in step 3 raised the explained variance by 2.3% (R^2 change = 0.023 $p < 0.001$). A total of 6 variables accounted for 51.4% of the variance in intention (43.7% and 43.9% in Tanzania and Sudan, respectively). In the final equation, attitude was by far the strongest predictor of intention ($\beta = 0.35$), followed in descending order by subjective norms ($\beta = 0.22$), moral norm ($\beta = 0.17$), perceived behavioural control ($\beta = 0.16$) and past experience ($\beta = 0.06$). The effect of country ($\beta = 0.35$, $p < 0.001$) in step 1 was reduced to ($\beta = 0.04$, $p = 0.099$) in the final third step, whereas the strength of the effect from past behaviour was maintained from step 1 ($\beta = 0.08$, $p < 0.001$) to step 3 ($\beta = 0.06$, $p < 0.001$). Statistically significant two-way interactions occurred, in terms of country \times attitudes (R^2 change 0.007, F change = 13.7, $p < 0.001$) and country \times subjective norms (R^2 change 0.009, F change = 17.0, $p < 0.001$). Stratified analyses suggested that the relationship between attitude and intention and between subjective norms and intention were statistically significantly stronger in Sudanese- than in Tanzanian students.

Discussion

This study supports the applicability of an extended version of the TPB to students' intended care delivery for patients with HIV and AIDS in two culturally different sub-Saharan African countries. According to the CFA, the extended TPB questionnaire reflected four concepts across

the study sites in terms of attitudes, subjective norms, moral norms and intention, thus lending support to its within construct validity, formally. This appears to imply that the four constructs underlying the TPB questionnaire are discrete measures that can be reliably assessed in Tanzanian and Sudanese students and that those measures can be reported as four summary scores.

A total of six variables explained 51% of the variance in health care delivery intentions across study sites. After having controlled for country and past behaviour, attitudes, subjective norms and perceived behavioural control accounted for an additional 34% of the explainable variance in intention. This finding is consistent with those of previous studies, whereby the TPB has explained 68% of nurses' intention to adhere to universal precautions, 48% of health workers' intention to provide home care for HIV infected individuals, 35% of nurses' intention to care for SARS patients and 70% of nurses intended labour support [29-33]. In line with a growing body of research supporting the role of perceived moral obligations as an independent predictor of intention, moral norms contributed 2.3% to the explained variance in students' intentions after controlling for the TPB variables. This factor which has moral connotations and represents personal feelings of responsibility has been considered to be important in the adoption of several health related behaviours [36,37]. Conner and Armitage [25] found that moral norms contributed an additional 4% of the variance in intention after controlling for the TPB across various behaviours. The present results suggest that the TPB and its extended version is useful in the SSA context in terms of identifying correlates of health care delivery that can be targets in interventions aimed at improving health care delivery to HIV infected patients.

A major shortcoming of the TPB model has been its inability to account for the influence of past behaviour [42,43]. Evidence from meta-analytical reviews suggests

Table 3: Intention to provide surgical treatment to HIV and AIDS patients by attitudes, subjective norms, perceived behavioural control and moral norms.

Model	R	R ²	R ² change	Beta ^a
<i>Step 1</i>				
Country				-0.05ns
Past behaviour	0.39	0.157**	0.157**	0.06*
<i>Step 2</i>				
Attitudes				0.35**
Subjective norms				0.22**
Perceived behavioural control	0.70	0.491**	0.334**	0.16**
<i>Step 3</i>				
Moral norm	0.71	0.51**	0.023**	0.17**

** $p < 0.001$, * $p < 0.05$

^a Standardized regression coefficients (beta), final step

that the addition of past behaviour to the TPB explains on average 7% of the variance in intention [25]. In this study, past experience significantly predicted intention after controlling for the TPB and moral norms and left the cognitive variables of the model almost unaffected. This suggests that the TPB provides a fairly accurate description of the intention formation process considering HIV and AIDS related care delivery among Tanzanian and Sudanese students. Students decide upon care delivery for HIV infected patients mainly as a consequence of situation specific expectations of the behaviour itself and to a lesser extent because they have engaged in similar care delivery previously.

Tanzanian and Sudanese students had on average strong intentions to provide surgical treatment to HIV infected patients as part of their future professional work. In contrast, in a study of Taiwanese nurse students' care intentions, almost all stated that they did not intend to care for HIV infected patients [44]. In this study, intended health care delivery was primarily driven by attitudes followed in descending order of importance by social norms, moral norms and perceived behavioural control in both countries. This finding is congruent with findings in other studies of treatment delivery and compliance with precautions in health care workers [29-32]. This finding is also similar to that reported by Sauls [33], who identified attitudes as more influential in determining health care delivery intentions than subjective norms. In contrast, Vermette and Godin [30] found perceived behavioural control to be the strongest influencing factor of nurses' intention to provide home care for HIV infected people. Students who did not express confidence in their ability to circumvent difficulties associated with care delivery, who evaluated care delivery negatively and who felt less normative pressure from colleagues at the faculty and less moral obligations to act were less likely to have strong intentions. These findings add insight to faculty administrators and educators to further develop strategies to increase students' intention to care for patients with HIV and AIDS. Providing sufficient and adequate protective equipments, routinely practicing infection control measures and protocols and providing up to date continuing education and training exercises should improve students' ability to overcome perceived obstacles related to care delivery. Even more important is the enhancement and reinforcement of students' positive attitudes through verbal expression of approval, persuasive messages based on strong arguments, substantial rewards and psychological support by faculty staff to encourage and acknowledge their efforts. Students' decision to provide surgical treatment to HIV infected patients was also influenced by their expectations that faculty colleagues would approve their provision of such treatment. In planning intervention programs, one approach which could be particularly important among

students having less care delivery experience is to train peer leaders to communicate the importance of quality care for HIV infected patients. Interventions might also benefit from making students' focus on moral obligations by increasing their awareness of others' needs and their perception that providing quality care could help relieve such needs.

Some limitations of this study should be considered when drawing inferences based upon its results. In Tanzania, dental and medical students were recruited from one university, thus the representativeness of the findings to other undergraduate- and post-graduate students is unknown. Self-selection might also be a potential limitation since the students who chose to participate might differ from those who did not implying that only students with interest in health care delivery for HIV infected patients responded to the survey invitation. Students might have over reported intention to provide surgical treatment to HIV infected patients because of social desirability bias. However, a general effect of low reliability is weak associations between variables. Thus, the magnitude of the correlations presented, and the findings harmonizing with the TPB indicate acceptable reliability as well as validity of the results. Past experience as assessed in this study was limited to the extent that it provided no information about the level and frequency of HIV and AIDS related care delivery. Whereas the present findings support the notion that the TPB model is applicable in the sub-Saharan African context, it says nothing about the validity of the model per se, only that the TPB is just as useful in sub Saharan Africa as in other industrialized country contexts.

Conclusion

The TPB is applicable to students' intention to provide health care to patients with HIV and AIDS across two sub-Saharan African countries. It is suggested that attitudes, subjective norms, moral norms and perceived behavioural control are key factors in students' decision to treat HIV infected patients and should be targeted in interventions aimed at improving health care quality in the context of HIV and AIDS.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

ANÅ: Principle investigator at both sites who conceived of the study, analyzed the data and did the manuscript writing. EN: Participated in the design and analyses of the Sudanese data. Responsible for collecting the Sudanese data.

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Utilization of dental health care services in context of the HIV epidemic- a cross-sectional study of dental patients in the Sudan

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Abstract

Background: HIV infected patients should be expected in the Sudanese dental health care services with an increasing frequency. Dental care utilization in the context of the HIV epidemic is generally poorly understood. Focusing on Sudanese dental patients with reported unknown HIV status, this study assessed the extent to which Andersen's model in terms of predisposing (socio-demographics), enabling (knowledge, attitudes and perceived risk related to HIV) and need related factors (oral health status) predict dental care utilization. It was hypothesized that enabling factors would add to the explanation of dental care utilization beyond that of predisposing and need related factors.

Methods: Dental patients were recruited from Khartoum Dental Teaching Hospital (KDTH) and University of Science and Technology (UST) during March-July 2008. A total of 1262 patients (mean age 30.7, 56.5% females and 61% from KDTH) were examined clinically (DMFT) and participated in an interview.

Results: A total of 53.9% confirmed having attended a dental clinic for treatment at least once in the past 2 years. Logistic regression analysis revealed that predisposing factors; travelling inside Sudan (OR = 0.5) were associated with lower odds and females were associated with higher odds (OR = 2.0) for dental service utilization. Enabling factors; higher knowledge of HIV transmission (OR = 0.6) and higher HIV related experience (OR = 0.7) were associated with lower odds, whereas positive attitudes towards infected people and high perceived risk of contagion (OR = 1.3) were associated with higher odds for dental care utilization. Among need related factors dental caries experience was strongly associated with dental care utilization (OR = 4.8).

Conclusion: Disparity in the history of dental care utilization goes beyond socio-demographic position and need for dental care. Public awareness of HIV infection control and confidence on the competence of dentists should be improved to minimize avoidance behaviour and help establish dental health care patterns in Sudan.

Background

The number of dentists in the public sector in Sudan has increased from 244 to 512 in the period from 2003 to 2007 and the dentist population ratio in Khartoum state (1.7:100000) is the highest in the country [1]. Dental care utilization of the public in light of the Human Immunodeficiency Virus (HIV) epidemic is so far poorly understood. With the exception of the Sudan the HIV epidemics in the Middle East and North Africa is comparatively small [2]. This is particularly so in Sub-Saharan Africa where an estimated 22 million people were living with HIV and Acquired Immune Deficiency Syndrome (AIDS) towards the end of 2007 and where access to dental health care services is commonly very limited [3,4]. In Sudan, the largest country on the Sub Saharan African continent, the prevalence of HIV and AIDS is still low. According to a population based study conducted in 2002, the sero-prevalence was estimated to be 1.6% [5,6]. However, being bordered by nine countries, some having a high prevalence of HIV and AIDS and having experienced long term ethnical and political conflicts, Sudan is vulnerable for an increase in the prevalence of HIV infections [5]. Thus, HIV infected patients should continue to be expected in the Sudanese dental health care services with an increasing frequency.

Oral lesions might be encountered at an early stage of HIV infection [7]. Weinert et al. [8] identified 16 oral conditions that might occur in HIV infected patients, seven of which can be suppressed by drug therapy. Oral health professionals can contribute to early diagnosis, prevention and treatment of HIV and AIDS infection [9]. Thus, it is recommended that HIV infected individuals should see a dentist regularly [10]. A number of studies have indicated unwillingness on the part of dental professionals to treat persons with HIV and AIDS due to fear of loosing non-HIV infected patients [11,12]. Since cross-infection might take place from patient to patient, from dentist to patient and vice versa, the advent of the HIV pandemic with increased awareness of cross infection among dental professionals and the public, has necessitated introduction of strict HIV protective procedures in dentistry [13,14]. However, poor compliance with standard infection control procedures have been reported, for instance in the South African Demographic and Health Survey of 1988 as well as more recent studies [15-17].

Recent findings based on the 1998 Community Health Assessment Project (CHAP) and the Behavioural Risk Factor Surveillance System (BRFSS) revealed that socio-demographics in terms of race (whites more likely to visit the dentist), income (higher income most likely to visit the dentist), education (higher education more likely to visit the dentist) and marital status (married most likely to

visit the dentist) are the most important determinants of dental visiting habits in the general US population [14,18,19]. Several other factors have been reported to be associated with use of dental care, such as gender, non-poverty status, having a positive attitude towards dental health- and dental health care, having pain and being dentate [14,19,20]. Little is known, with respect to the public's HIV related knowledge, attitudes and fear of contagion in the dental environment and how such perceptions impact dental attendance patterns. Humphris et al. [21] reported that one third of the UK regular dental attendees believed that there was at least a slight risk of contracting HIV infection at the dental clinic. Lancaster et al [22] reported common misunderstandings regarding the public's knowledge about HIV and AIDS. In a Nigerian study of public perceptions of cross-infection control in dentistry, more than half of the respondents investigated felt that they could contract an infection in the dental clinic and 43% identified HIV as a risk [23]. Pistorius et al [24] examined dental patients in Germany and found that about 17% were generally afraid of contracting an infection at a dental office. Thomson et al [25] examined perceptions of cross infection in dentistry among Australians and found that 3.6% reported delayed or avoided dental visits due to perceived cross infection, the avoidance rate being highest in females and those who reported concern about cross infection control. A Mexican study revealed that only 21.2% of the study participants intended to continue treatment at a dental practice where patients with HIV were treated and 20% had similar intentions if the dentist was HIV positive [12]. To date, there has been no study exploring dental care utilization in the context of public knowledge of HIV and AIDS and perceived risk of contagion in the Sudan.

This study applies Andersen's Behavioural model of Health services uptake (Figure 1) to guide the selection of variables to be associated with the utilization of dental health care services in Sudan [26]. According to this model, people's use of health service over a given period is a function of predisposing factors, enabling resources and treatment needs. Predisposing factors are based on the proposition that socio-demographics such as age, gender and ethnicity influence an individual's propensity to use health care services. Enabling factors include economic- and social resources that facilitate or impede use of health care whereas need related characteristics refer to the presence of clinically assessed and self-perceived disease status. Various predisposing and enabling factors might alter the use of health care services and the model suggests feedback loops, indicating that outcomes (*e.g.* use of health care services) might affect subsequent predisposing, enabling- and need related characteristics of individuals.

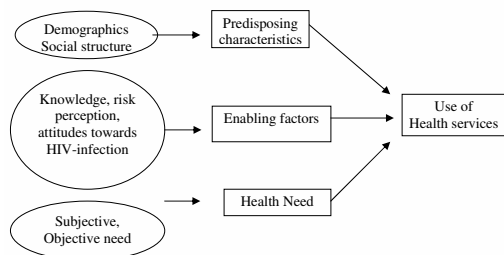


Figure 1
Modified health service use behavioural model.

Focusing on a sample of Sudanese dental patients with reported unknown HIV status, this study assessed the extent to which the components of Andersen's model in terms of predisposing factors (socio-demographics), enabling factors (knowledge, attitudes and perceived risk related to HIV and AIDS infection in dental practices) and need related factors (clinically and self perceived oral health status) predict dental care utilization in terms of their relative contribution. It was hypothesized that enabling factors in terms of HIV related knowledge, attitudes and fear of contagion would add to the explanation of dental care utilization independent of predisposing- and need related factors.

Methods

Study participants

The present cross-sectional study was carried out from March to July 2008. Survey participants were recruited from dental clinics at two teaching hospitals in Khartoum state; Khartoum Dental Teaching Hospital (KDTH) and University of Science and Technology (UST). In both hospitals, all patients coming with dental complains are registered and then seen at the outpatients 'diagnostic' department for oral examination. All patients between 20 and 60 years of age with reported unknown HIV and AIDS status were invited to participate in the study. A total of 769 patients in KDTH (response rate 769/2650, 29.0%) and 491 patients in UST (response rate 491/950, 52%) consented to participate in a clinical examination, and an interview. Pre-test and post-test counselling was arranged before the conduction of the study. Reason for not participating was mainly due to time constraints on the part of patients and eagerness to receive the dental treatment. A sample size of 1200 patients was assumed to be satisfactory for a two-sided test assuming the proportion of dental care utilization in the previous 2 years to be 0.15 and 0.20 in patients with respectively low- and high education, a significance level of 5% and a power of 95%. Ethical permission was obtained from the Norwegian

Regional Ethical Committee, Sudan National AIDS Programme (SNAP) and from the UST, and KDTH prior to conduction of the study.

Oral Examination

One trained and calibrated dentist (EFN) conducted all clinical examinations in dental clinic settings equipped with an adjustable dental chair and artificial lightening. Examination was conducted using disposable gloves, sterilized dental mirrors, periodontal probes and dental explorers. Dental caries was recorded using the Decayed, Missing, Filled Teeth (DMFT) index, according to the guidelines by WHO [27] and recorded 0 or 1 (no caries experience, DMFT>0). Duplicate clinical caries registrations with 2 months interval were carried out among four-teen chair side dental assistants at UST. Intra examiner reliability in terms of Cohen's kappa for the DMFT components was 1.

Interviews

A structured face-to-face interview including, questions on socio-demographic characteristics, oral health related behaviours, sources of HIV and AIDS related information, HIV related knowledge and attitudes was constructed in English and translated into Arabic by a dentist and then re-translated back to English by another dentist to check for consistency in the language. Two dentists (a male and a female) were assigned and trained for carrying out the interviews. Patients were interviewed in a confidential atmosphere while waiting for the clinical examination. The behavioural model proposed by Andersen was applied to identify variables to be considered relative to the use of dental health care services.

Independent variables

Predisposing factors were assessed in terms of Socio-demographic factors; age, gender, hospital attended, profession, level of education and travelling inside/outside Sudan (Table 1). *Enabling factors* were assessed in terms of 1) amount of information about HIV and AIDS received from various sources, 2) knowledge on HIV transmission, 3) knowledge on HIV risk groups, 4) previous experience with HIV/AIDS, 5) perceived personal risk of contracting HIV/AIDS, 6) attitudes towards people with HIV and AIDS, 7) attitudes towards HIV dental clinics. *Amount of information about HIV and AIDS from various sources* were assessed using 4 questions "How much information about HIV-related issues have you received from 1) radio/TV, 2) reading materials, 3) friends/relative, and 4) health care workers". Each question had response categories ranging from (1) "little" to (5) "very much". For cross tabulation each question was dichotomized into (0) "some/little received" (original categories 1, 2, 3) and (1) "much/very much information received" (original categories 4, 5). A formative sum score was constructed and dichot-

omized based on a median split yielding (1) "very much/much HIV information received" and (0) "some/little/none HIV information received". *Knowledge about modes of HIV transmission* was assessed using the statements: "HIV can be transmitted by 1) using contaminated sharp instruments, 2) unsafe blood transfusion, 3) shaking hands, 4) eating with infected people". Each statement had response category in the range from (1) "strongly disagree" to (5) "strongly agree" for statements 1 and 2, and (1) "strongly agree" to (5) "strongly disagree" for statements 3 and 4. Each statement was dichotomized yielding (1) "correct knowledge" (original categories 4, 5) and (0) "incorrect knowledge" (original categories 1, 2, 3). A sum score of knowledge on transmission was constructed from the 4 dummy variables and dichotomized based on a median split into (1) "Correct overall knowledge" and (0) "Incorrect overall knowledge". *Knowledge of risk groups* was assessed by 5 statements with responses (1) "correct" and (0) "incorrect". The patients were asked "Is it correct or incorrect that university students, barbers, prisoners, soldiers, and health care workers are considered as high risk groups by profession"? One formative sum score was constructed from the 5 dummy variables. The sum score was dichotomized based on a median split into (1) "Correct knowledge on occupational risk groups" and (0) "Incorrect knowledge on occupational risk groups". *Previous experience with HIV and AIDS* was assessed using 3 items in terms of 1) "Have you known personally a person that is HIV positive? 2) Have you known personally any person that is sick with AIDS? 3) Have you known any person

who has died because of AIDS?" Response categories were (1) Yes and (0) No. A sum variable was constructed from the three dummy variables and dichotomized based on a median split into 0 for "no experience" and 1 for "experience". *Perceived personal risk of contracting HIV and AIDS* was assessed by one question "How do you rate your own risk as a patient of contracting HIV and AIDS when attending dental practice. Responses were given on a scale in the range (1) No risk to (4) Great risk and dichotomized into (0) low risk (original categories 1, 2) and (1) high risk (original categories 3, 4). *Attitudes towards people with HIV and AIDS were assessed* by four statements; 1) I would go and visit a friend/relative if I knew that he/she had HIV and AIDS, 2) I would continue to be a friend with someone who got HIV-infection, 3) if a member of my family became sick with HIV and AIDS I would want this to remain secret, and 4) I would be willing to take care of someone with HIV and AIDS. Responses were given on 5-points Likert scales (1) strongly disagree to (5) strongly agree. Dummy variables (0) negative attitude, (1) positive attitude were constructed and added into a sum score. The sum score was dichotomized based on a median split into (0) for negative attitude towards people with HIV and AIDS, (1) for positive attitude towards people with HIV and AIDS'. *Attitudes towards dental clinics* were assessed by three statements; 1) and AIDS should be allowed to attend regular dental practices, 2) if a dentist/medical doctor has HIV but is not sick they should be allowed to continue their clinical work, 3) I would continue to visit a dental clinic if I knew that and AIDS were treated there.

Table 1: Percentage distribution (n) of dental patients' socio-demographic characteristics (predisposing factors) in UST and KDTH hospitals:

Characteristic	UST % (n)	KDTH % (n)	Total % (n)
Gender			
Male	35.2 (173)	48.6 (373)	43.5 (548)
Female	64.8 (318)**	51.4 (394)	56.5 (712)
Age			
≤ 29	47.6 (233)	58.3 (447)	54.2 (682)
≥ 30	52.4 (257)**	41.7 (320)	45.8 (577)
Marital status			
Single	43.0 (211)	48.0 (369)	54.2 (682)
In relationship	57.0 (280)	52.0 (400)	45.8 (577)
Education			
Primary/secondary	48.3 (237)	45.4 (349)	46.5 (586)
University and higher	51.7 (254)	54.6 (420)	53.5 (674)
Profession			
Unemployed, other	62.0 (304)	57.6 (442)	59.3 (746)
Technical, office, skilled labour	38.0 (186)	42.4 (325)	40.7 (513)
Travelling inside Sudan			
Yes	85.9 (420)	83.3 (639)	83.4 (1061)
No	14.1 (69)	16.7 (128)	15.7 (197)
Travelling outside Sudan			
Yes	41.5 (203)**	26.9 (206)	32.6 (410)
No	58.5 (286)	73.1 (561)	67.4 (848)

** p < 0.001, *p < 0.05

Responses were given on 5 point Likert scale (1) 'strongly disagree to (5) strongly agree. Dummy variables were constructed and added into a sum score. This sum score was dichotomized based on a median split into (0) for negative attitude towards dental clinics and (1) for positive attitude towards dental clinics. *Need related factors* were assessed in terms of "How do you perceive your general health status?", "How do you consider the present condition of your mouth and teeth with categories (1) good, (0) bad and "Are you satisfied with the appearance of your teeth with categories (1) satisfied, (0) dissatisfied.

Dependent variable

Use of dental services was assessed by asking "During the past 2 years - have you attended a dental clinic in order to receive treatment? Responses were given as (1) yes and (2) no.

Statistical Methods

Data were analyzed using the Statistical Package for Social Sciences version 15.0 (SPSS Inc., Chicago, Illinois, USA). Bivariate analyses were conducted using cross-tabulations and Chi-square statistics. Determinants of use of dental care services were examined by multiple binary logistic regression analysis using the logistic model and 95% Confidence Interval (CI) whilst taking into account the hierarchical relationship between the various independent variables, as hypothesized by Anderson's model [28]. After controlling for predisposing factors (socio-demographics) at step I, enabling factors and need related factors were entered in step II and step III, respectively. Initially, multiple logistic regression analyses were conducted with the variables at each step separately (including all variables that were statistically significantly associated with utilization of dental care in bivariate analysis). Variables to be included in the various steps of the final hierarchical model were selected if $p < 0.05$ after adjustment for all other "same step" variables.

Results

Sample profile- predisposing factors by hospital of attendance

A total of 1262 dental patients participated in the study (mean age 30.7, Standard Deviation (SD) 8.5), 56.5% females and 61.0% from KDTH. Most of the participants (42.9%) resided in Omdurman city, followed by (31.4%) in Khartoum city, (16.2%) in Khartoum North city, and (9.5%) in other states. Table 1 gives the percentage distribution of participants' socio-demographic characteristics (predisposing factors) according to hospital of attendance. The patients attending UST were less frequently males (35.2% versus 48.6%), less frequently in the younger age group (47.6% and 58.3%), and had more frequently travelled outside Sudan (41.5% versus 26.9%) as compared to their KDTH counterparts.

Enabling- and need related factors by hospital of attendance

Table 2 depicts the percentage distribution of sum scores of enabling (information received about HIV-related issues, knowledge on modes of transmission, knowledge on risk groups, personal experience of HIV and AIDS, perceived risk of HIV infection and attitudes towards dental clinics and HIV infected people) and need related factors (DMFT, perceived general and oral health) based on hospital of attendance. Moderate proportions of patients scored high on information received (39.5%), knowledge on transmission (73.3%) and knowledge on risk groups (66.8%). Moderate proportions had positive attitudes towards HIV dental clinics (49.6%) and people with HIV and AIDS (35.1%). A majority reported no experience with HIV infected people (75.6%), fear of HIV contagion in the dental environment (75.6%) and good oral (56.3%) and general health condition (73.3%). Compared with their UST counterparts, patients from KDTH were more frequently satisfied with teeth condition (50.2% versus 40.8%, $p < 0.01$), perceived less frequently a good general health (71.1% versus 76.8%, $p < 0.05$), and more frequently good teeth condition (61.0% versus 49.0%, $p < 0.01$). Compared with their UST counterparts, KDTH patients had more frequently positive attitudes towards dental clinics (39.0% versus 29.2%, $p < 0.01$), but showed less frequently positive attitudes towards HIV infected people (46.7% versus 54.1%, $p < 0.05$). The mean DMFT was 7.23, (SD 4.6) and the proportion of dental caries experience (DMFT>0) was 97.6%. The corresponding proportions of subjects with DT>0, FT>0 and MT>0 were respectively, 96.2%, 15.4% and 66.3%.

Predisposing-, enabling and need related factors associated with use of dental services during the past 2 years

A total of 53.9% of the patients, 61.7% of the UST and 49% of the KDTH patients, confirmed dental treatment at least once during the 2 years preceding the study. Of those who confirmed dental attendance, 77.1% reported attendance at least twice during that period. Table 3 and Table 4 depict the frequency distribution of dental care utilization by predisposing- enabling- and need related factors. Use of dental service varied systematically between male and females (43.7% versus 61.7%, $p < 0.01$) and between unemployed and employed patients (56.5% versus 49.9%, $p < 0.05$). Patients having travelled inside and outside Sudan reported dental visiting more frequently than those who had not travelled. Use of dental care varied with knowledge of HIV transmission, (55.8% versus 48.5% in patients with low and high knowledge), previous experience with HIV and AIDS (64.7% versus 50.4% in patients with less and more experience), perceived personal risk as a dental patient (49.3% versus 57.1% in patients with low and high risk perceptions) and

Table 2: Frequency distribution of enabling- and need related factors by hospital of attendance

	UST %(n)	KDTH % (n)	Total% (n)
Enabling factors			
Information received			
Low	57.7 (282)	62.3 (478)	60.5 (760)
High	42.3 (207)	37.7 (289)	39.5 (496)
Knowledge on transmission			
Low	72.3 (355)	74.6 (572)	73.3 (927)
High	27.7 (136)	25.4 (195)	26.3 (331)
Knowledge on risk groups			
Low	66.0 (305)	67.3 (432)	66.8 (737)
High	34.0 (157)	32.7 (210)	33.2 (367)
Previous experience with HIV/AIDS			
Yes	27.1 (133)	22.8 (175)	24.5 (308)
No	72.9 (358)	77.2 (592)	75.6 (952)
Perceived personal risk as dental patients			
Low	39.7 (195)	42.4 (325)	41.3 (308)
High	60.3 (296)	57.6 (442)	59.3 (744)
Attitudes towards people with HIV-infection			
Negative	45.9 (225)	53.3 (409)	50.4 (634)
Positive	54.1 (265)*	46.7 (358)	50.6 (624)
Attitudes towards dental clinics			
Negative	70.8 (347)	61.0 (468)	64.8 (815)
Positive	29.2 (143)	39.0 (299)**	35.1 (442)
Need related factors			
DMFT			
Zero	3.1 (15)	2.0 (15)	2.4 (30)
One or more	96.9 (476)	98.0 (754)	97.6 (1230)
Perceived general health			
Bad	23.2 (113)	28.9 (222)*	26.7 (335)
Good	76.8 (375)	71.1 (545)	73.3 (920)
Perceived teeth condition			
Bad	51.0 (249)**	39.0 (299)	43.7 (548)
Good	49.0 (239)	61.0 (468)	56.3 (707)
Satisfaction with teeth condition			
No	59.2(289)**	49.8 (382)	53.5 (671)
Yes	40.8 (199)	50.2 (385)	46.5 (584)

** $p < 0.001$, * $p < 0.05$

attitudes towards HIV infected persons (48.3% versus 59.4% in patients with negative and positive attitudes). Use of dental care varied systematically with caries experience (20.0% versus 54.7% in patients without and with dental caries).

Initial unconditional regression analysis with dental care utilization as the dependent variable selected hospital attended, gender, travelling inside Sudan, travelling outside Sudan, knowledge of HIV transmission, perceived personal risk or HIV contagion, experience with patients with HIV, attitudes towards HIV infected patients, caries experience, perceived oral health status and perceived general health status to be included in the final logistic regression analysis. Predisposing factors in terms of hospital of attendance, gender, travelling inside/outside Sudan were entered in the first step explaining 6.9% of the vari-

ance in use of dental care (Nagelkerke's R square 0.069, $p < 0.01$). Entering enabling factors in step II in terms of knowledge on HIV transmission, personal experience with HIV/AIDS infected people, perceived risk of contagion in dentistry and attitudes towards HIV infected people raised the explained variance to 10.4% (Nagelkerke's R squared 0.104, $p < 0.000$). Entering need related variables in step III in terms of DMFT status, perceived oral health and general health raised the explained variance to a final 16.8% (Nagelkerke's R square 0.168, $p < 0.01$) (Table 5). In the final model, KDTH patients and patients that had not travelled inside Sudan were less likely whereas females were more likely to have attended dental care for treatment than were their counterparts in the opposite groups. Patients having high knowledge on transmission and high HIV-related experiences were less likely- and patients having positive attitudes and per-

Table 3: Percentage distribution (n) of use of dental service by socio-demographic characteristics (predisposing factors).

Predisposing factors	Use of dental service % (n)
Hospital of examination	
UST	61.7 (301)**
KDTH	49.0 (376)
Gender	
Male	43.7 (239)
Female	61.7 (438)**
Age	
15-29	52.0 (354)
More than 30	56.2 (323)
Marital status	
Single	52.0 (354)
In relationship	56.2 (323)
Education	
Primary and secondary	53.4 (313)
University and higher	54.2 (363)
Profession	
Unemployed, other	56.5 (421)*
Technical, office, skilled labour	49.9 (255)
Travelling inside Sudan	
Yes	55.1 (583)*
No	46.9 (92)
Travelling outside Sudan	
Yes	55.1 (583)*
No	46.9 (92)

Percentages of those who confirmed dental care utilization during the 2 years preceding the study.

** $p < 0.001$, * $p < 0.05$

ceived high risk of HIV contagion were more likely to have used dental health care services than their counterparts in the opposite groups. Patients with caries experience and those who perceived good general health condition were more likely-, whereas patients who perceived good teeth condition were less likely to have attended dental care for treatment (Table 5). Stratified analyses revealed that the model explained 18% and 16% of the variance in dental care service use in KDTH and UST respectively. Statistically significant two way interaction was identified between perceived health- and DMFT status upon use of dental care. Stratified analyses by perceived health status revealed that among patients who perceived their health status to be good, those with caries were more likely than their caries-free counterparts to have visited a dentist during the 2 years preceding the study (OR = 10.3 95% CI 2.3-45.3). Among patient with bad health perceptions the relationship between DMFT status and dental health care services use was not statistically significant (OR = 1.8, 95% CI 0.5-6.3).

Discussion

This study is the first to confirm disparities in dental care utilization of Sudanese adult dental patients according to selected predisposing-, enabling- and need related factors. In accordance with the propositions of Andersen's behav-

oural model the present results confirmed the relationships between dental care utilization and socio-demographics (predisposing factors), HIV related knowledge, attitudes and perceived risk (enabling factors) and clinical (objective) - and subjective oral health indicators (need related factors). This suggests that use of dental health care services might be explained by variables organized into the three conceptual domains of predisposing, enabling and need-related factors among Sudanese adults attending university referral hospitals in Khartoum state. In addition, enabling factors, such as knowledge of HIV transmission, perceived personal risk of contagion, experience with HIV-infected people and attitudes towards HIV infected people contributed independently to the explained variance in dental care beyond that of predisposing- and need related factors. Nevertheless, the model explained only 18% and 16% of the variance in dental care utilization in KDTH and UST, indicating the importance of other influencing factors not accounted for in the present study, such as culture, dental cost, affordability and aspects of the Sudanese dental care system itself. Predisposing and need-related factors were the strongest predictors of dental care utilization in the total sample, as well as separately in the samples from UST and KDTH. Notably, it is not possible to assert that the present results demonstrate the crude impacts of the various factors considered since each could be biased by background confounding factors. Moreover, the study participants were patients attending two referral university hospitals for treatment, implicating that individuals who attended dental care for prophylactic- or other reasons, were excluded from the study group. This might have led to an overestimation of previous utilization rate since dental attendees that were excluded might also be low frequent users of dental care. They might also possess HIV-related attitudes and perceptions that are different from those of the respondents in the present study. Although this study provides valuable information by focusing on dental patients, it is unsure how close an approximation the present estimates are to the real situation of the general adult population in Khartoum state. Thus, studies based on random samples from the broader population could be recommended for future studies to provide answers to questions such as whether there are differences among dental attendees and non attendees regarding their perceptions of HIV-related issues and contagion in the dental environment.

About half of the investigated patients, and UST patients more frequently than KDTH patients, reported having received dental care at least once during the 2 years preceding the study. Evidently, the percentage of regular dental attendees varies across different populations. It has been reported to vary between 24% and 26% among adults in Tanzania and Nigeria, respectively [19,29,30]. In

Table 4: Percentage distribution of use of dental care by enabling- and need related factors.

Enabling factors	Use of dental service % (n)
Information received	
Low	53.5 (406)
High	54.2 (269)
Knowledge on transmission	
Low	55.8 (516)*
High	48.5 (161)
Knowledge on risk groups	
Low	55.6 (410)
High	56.3 (206)
Previous experience	
No	64.7 (198)**
Yes	50.4 (479)
Perceived risk of health workers	
Low	50.9 (327)
High	57.0 (350)*
Perceived personal risk as dental patients	
Low	49.3 (257)
High	57.1 (420)
Attitudes towards HIV-infected persons	
Negative	48.3 (307)
Positive	59.4 (369)**
Attitudes towards dental clinics HCW/patients HIV-infected	
Negative	56.4 (459)*
Positive	49.1 (217)
Need related factors	
DMFT	
Zero	20.0 (6)
One or more	54.7 (671)**
Perceived general health	
Bad	45.1 (151)
Good	57.0 (526)**
Teeth condition	
Bad	65.9 (361)**
Good	44.6 (316)
Satisfaction with oral condition	
No	55.7 (374)
Yes	51.8 (303)

Percentages of those who confirmed dental care utilization during the 2 years preceding the study.

P value < 0.05 = *, P value < 0.01 = **

spite of the relatively high rate of dental attendance as identified by the present study, about 96% presented with untreated dental caries and half the sample was dissatisfied with their tooth condition (Table 2). Andersen's health behaviour model proposes that efficient access to health care services might be established when the level of health status improves relative to the amount of health care services received [26]. The present results indicating high levels of untreated dental caries irrespective of dental attendance frequency might point towards an inefficient access to oral health care services in Sudan. The number of dentists in the public sector in Sudan, has increased from 244 to 512 in the period from 2003 to 2007, which meant the expansion of coverage as well as access to dental services [1]. As shown in Table 4, higher rates of dental care

utilization were found among patients having dental caries and perceiving a bad dental condition but also among those who were satisfied with their general health status, suggesting that the utilization pattern of health care services for medical and dental problems differ [29]. Thus, the burden from a bad general health condition might compete with contemporaneous effects of oral health problems regarding dental care utilization. This reasoning was supported by the identification of an interaction effect of perceived health condition and dental caries, indicating that dental caries did not impact utilization rates among participants considering their health condition to be bad. If a bad general health condition has higher priority compared to oral health needs, members of the public that are in bad physical condition will not receive appropriate lev-

Table 5: Use of dental care regressed upon predisposing, enabling and need related factors: Odds ratios (OR) and 95% Confidence Intervals (95% CI)

	Adjusted OR (95% CI)	Adjusted OR (95% CI)	Adjusted OR (95% CI)
Step I Predisposing factors	Total sample	KDTH	UST
Travelling outside Sudan			
Yes	1	1	1
No	0.8 (0.6-1.0)	0.8 (0.6-1.2)	0.7 (0.4-1.1)
Travelling inside Sudan:			
Yes	1	1	1
No	0.5 (0.4-0.8)	0.5 (0.3-0.8)	0.6 (0.3-1.2)
Gender:			
Male	1	1	1
Female	2.0 (1.5-2.4)	1.9 (1.3-2.6)	2.1 (1.4-3.2)
Hospital:			
UST	1		
KDTH	0.8 (0.5-0.9)		
Nagelkerke's R² = 0.069			
Step II Enabling factors			
Knowledge HIV transmission:			
Low	1	1	1
High	0.6 (0.4-0.8)	0.7 (0.5-1.1)	0.5 (0.3-0.7)
Perceived personal risk:			
Low	1	1	1
High	1.3 (1.1-1.6)	1.2 (0.8-1.6)	1.3 (0.9-2.0)
Experience HIV/AIDS:			
Low	1	1	1
High	0.7 (0.5-0.8)	0.6 (0.4-0.9)	0.8 (0.5-1.3)
Attitudes towards HIV infected people:			
Negative	1	1	1
Positive	1.3 (1.0-1.6)	1.3 (0.9-1.7)	1.2 (0.8-1.8)
Nagelkerke's R² = 0.104			
Step III Need related factors			
DMFT: 0	1	1	1
DMFT>0	4.8 (1.9-12.4)	2.1 (0.6-7.1)	14.9 (3.1-72.1)
Teeth condition:			
Bad	1	1	1
Good	0.5 (0.3-0.5)	0.4 (0.2-0.5)	0.5 (0.3-0.8)
Health condition:			
Bad	1	1	1
Good	1.9 (1.4-2.5)	2.7 (1.8-3.9)	0.9 (0.5-1.5)
Nagelkerke's R² = 0.168			

* Controlled for age

els of dental care. This accords with previous results in terms of people reporting more unmet need for dental health care than for general health care services [31].

Having been travelling inside Sudan and being a female increased the odds of having received dental care during the 2 years preceding this study. To the extent that travelling reflects higher socio-economic position of the participants, the present results accord with numerous studies globally showing that use of dental care occurs more frequently in females and socio-economically advantaged-compared with males and socio-economically disadvan-

taged groups [19]. The finding that females were the most frequent previous users of dental care is consistent with their reported propensity to possess more health related knowledge than men and also to be less likely to engage in health deteriorating behaviours. Unexpectedly, unemployed participants were more likely to use dental care than were their employed counterparts (Table 3). This result might reflect a "healthy worker effect" and also the fact that unemployed have more time to visit dental clinics than the employed part of the population. This finding is consistent with what has been reported in previous studies [10].

Although the majority of the participants were of higher education, most of them confirmed having received little HIV information, confirmed low levels of knowledge on transmission modes and risk groups, were un-experienced with HIV infected people and feared HIV contagion in the dental environment (Table 2). Whereas almost half of the study participants reported positive attitude towards HIV infected people, only a minority were in favour of ordinary dental clinics treating HIV infected patients. The relatively high level of fear of HIV infection observed among the study participants (75%) might reflect a certain scepticism about infectious control procedures taken by the dentist although being able to see infection control measures in action is not identical to either interpreting those measures or being aware their effectiveness. Studies from South Africa identified lack of protective eye wearing during dental procedures, not washing hands between patients, not disassembling an item prior disinfection/sterilization and not using sterile drill for each patient [17]. Studies of Nigerian patients and patients from industrialized countries have revealed that dental patients expect adequate infection control procedures and are informed that such measures are beneficial to both dental staff and patients [23]. On the other hand, large proportions of dental patients being totally ignorant to the sterilization methods utilized in dentistry have also been reported [32]. In light of previous studies suggesting that fear of contracting HIV tend to decrease with increasing level of education [24], the present results suggest that social resources related to HIV and AIDS seem to be influenced by factors other than people's educational level.

Being knowledgeable about modes of HIV transmission and having frequently been exposed to HIV and AIDS infected people seems to have impacted negatively- or acted as barriers towards dental care utilization (Table 4). On the other hand, having positive attitudes towards HIV infected people facilitated dental attendance. This is consistent with recent findings among dental attendees in Nigeria where about 60% of the study participants were unwilling to attend a dental clinic if they knew that patients with HIV were treated there [23]. Consistently, a German study of dental patients revealed that about 10% were in favour of separate waiting rooms for HIV infected patients [24]. An unwillingness to attend dental care on the part of patients being knowledgeable about transmission modes and experienced regarding HIV related issues is consistent with the findings of previous studies. Robinson and Croucher [33] investigated asymptomatic patients with HIV and found that among those who had attended dental care previously, 51% stopped after testing positive for HIV and AIDS. Personal experience with HIV and AIDS acting as a barrier towards utilization of dental care might be attributed to the fact that the estimated prevalence of HIV and AIDS is still low in Sudan and with

a general trend of keeping HIV infection in secret [33]. Concern about HIV contagion in dental practice was associated with more frequent use of dental care in the multivariate analyses which seems at first counterintuitive but are consistent with findings among dental attendees in the United States [34]. In contrast, studies from other industrialized countries have shown that concern about HIV contagion in dental practices increases the likelihood of dental avoidance behaviour [25]. It is possible that among those who expressed increased concern about HIV contagion, anticipated impacts of not receiving dental care have outweighed any perceived risk of cross-infection. Considering the cross-sectional design of the present study, increased concern about HIV contagion in dental practice might be a consequence of frequent experience with dental care and with the application of improper cross-infection control procedures in the dental environments.

Conclusion

The present data have shown that the components of Andersen's behavioural model explained 18% and 16% of the variance in dental care utilization of UST and KDTH patients, respectively. Enabling factors contributed independently to the explained variance in dental care beyond that of predisposing- and need related factors. Being knowledgeable about modes of HIV transmission and having positive attitudes towards HIV infected people impacted negatively and positively on dental care utilization. This suggests that disparities in dental care utilization of dental patients goes beyond socio-demographic position and need for dental care. According to the present study, dental patients had received little HIV information, confirmed low levels of knowledge on transmission modes and feared HIV contagion in the dental environment, whereas only a minority were in favour of ordinary dental clinics treating HIV infected patients. Together the present findings point to an urgent need for dental professionals and the government to address these disparities by improving public awareness of successful HIV infection control and confidence placed on the competences of dentists in order to minimize avoidance behaviour and to help establish dental health care patterns in this region.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

EFN: principle investigator, conceived of the study, designed the study, collected data, performed statistical analyses and manuscript writing. ANÄ: main supervisor guided the design of the study and has been actively involved in statistical analyses of data and in manuscript writing. JD: co-supervisor has been actively involved in statistical analyses and paper writing. RWA: co-supervisor

has provided valuable comments on the paper in general and has been actively involved in manuscript writing. All authors read and approved the final manuscript.

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Questionnaire for Senior Dental Students

Request to participate in this research

We would like to request you to participate in this research. This research is regarding the HIV-infection and oral health. Our effort is aiming towards maintaining our services to the public. The role of the dentist is to prevent rather than cure. Dental services are considered as source of HIV-infection, thus we are required to maintain our knowledge and skills to prevent cross infections. The participation is voluntarily, the confidentiality of participant is secured. The results of this research are to be made accessible for the purpose of quality assurance in dental practice. We highly appreciate your participation in the research.

We highly appreciate your acceptance in participating,
The study group

CONSENT FORM

I hereby declare that I have been fully informed about the research objectives, and I agreed voluntarily to participate. This participation is to contribute in the fight against HIV and AIDS.

Signature of participant-----

Date-----

Part (A): Demographic; *(This part will assess your personal information, please answer all questions).*

A.1. what is the name of your dental institute? -----

A.2. which academic year of study are you in?

- 1) Third
- 2) Fourth year
- 3) Fifth year

A.3. what is your gender?

- 1) Male
- 2) Female

A.4. what is your age? -----

A5. Where have you lived for the most part of your life?

1. City/town/urban
2. Village/rural

A.6. What is your father's/guardian's highest level of education?

1. No education
2. Adult education
3. Primary school
4. Secondary school
5. University/college
6. I do not know

A.7. What is your mother's /guardian's highest level of education?

- No education
- Adult education
- Primary school
- Secondary school
- University/college
- I do not know

A.8. where did you lived most of your life?

- a. Khartoum state
- b. Northern Sudan
- c. Eastern Sudan
- d. Western Sudan
- e. Southern Sudan
- f. Middle of Sudan
- g. Out of Sudan

A.9. Did you travel inside Sudan?

- 1) Yes.
- 2) No.

A.10. Did you travel outside Sudan?

- a. Yes.
- b. No.

A.11. Where would you prefer to do clinical work in the future?

- | Urban
- | Rural

A.12. How do you consider your general health status?

- | Excellent
- | Good
- | Satisfactory
- | Poor
- | Very poor

A.13. have you ever smoked cigarettes?

- Yes
- No

A.14. If yes- How often have you smoked cigarettes during the past three months?

1. Every day
2. Every week
3. A few times
4. Never

Part (B): In the following we will present statements about sources of information of HIV /AIDS and the credibility of those sources (*Choose the answer that fits you the best. Choose only one answer by putting a tick on the corresponding number of your answer, please answer all questions*).

B.1. How much information about HIV/AIDS related issues have you received from lectures in dental school?

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

B. 2. How much do you trust the information about HIV /AIDS related issues that you received from lectures in dental school?

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

B.3. How much information about HIV/AIDS related issues have you received from Radio/TV?

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

B. 4. How much do you trust the information about HIV/AIDS related issues that you received from Radio/TV?

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

B.5. How much information about HIV/AIDS related issues have you received from the internet?

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

B.6. How much do you trust the information about HIV/AIDS related issues that you received from the internet?

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

B.7. How much information about HIV/AIDS related issues have you received from newspapers/magazines/books?

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

B.8. How much do you trust the information about HIV /AIDS related issues that you received from newspapers/magazines/books?

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

B.9. How much information about HIV/AIDS related issues have you received from friends/relatives?

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

B.10. How much do you trust the information about HIV /AIDS related issues that you received from friends/relatives?

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

B.11. How much information about HIV/AIDS related issues have you received from health care workers?

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

B. 12. How much do you trust the information about HIV /AIDS related issues that you received from health care workers?

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

In the following part we present statements about various HIV/AIDS related issues. We ask you to agree/disagree with the statements. **Choose the answer that fits you the best. Choose only one answer by putting a tick on the corresponding number of your answer, please answer all questions**

B.13. I think that my knowledge about HIV and AIDS is adequate

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

B.14. I know more about HIV/AIDS than before I attended the university.

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

B.15. Condoms are safe in preventing HIV/AIDS.

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

B.16. HIV/AIDS transmits by unsafe blood transfusion

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

B.17. HIV/AIDS is transmitted by contaminated blood transfusion.

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

B.18. HIV/AIDS can be transmitted by using contaminated sharp instruments.

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

B.19. HIV/AIDS can be transmitted by shaking hands with infected persons.

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

B.20. HIV/AIDS can be transmitted by eating with infected persons.

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

B.21. HIV is diagnosed one a person has CD4 cell count less than 200 cells per mm³.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

B.22. How do you rate your need for further information/education regarding basic HIV /AIDS related issues?

1. No need
2. Slight need
3. Moderate need
4. Great need

B.23. Are you in need for further information/education regarding HIV patient management?

1. No need
2. Slight need
3. Moderate need
4. Great need

B.24. Are you in need for further information/education regarding treatment recommendations of HIV patients?

1. No need
2. Slight need
3. Moderate need
4. Great need

B.25. Are you in need for further information/education regarding advice on referrals of HIV/AIDS patients?

1. No need
2. Slight need
3. Moderate need
4. Great need

B.26. Are you in need for further information/education when it comes to assessment of clinical manifestations associated with HIV/AIDS?

1. No need
2. Slight need
3. Moderate need
4. Great need

B.27. Are you in need for further information/education when it comes to assessment of psycho-social complications associated with HIV/AIDS?

1. No need
2. Slight need
3. Moderate need
4. Great need

B.28. is it correct or incorrect that the following professional groups are considered as the high-risk groups by profession?

Group	Correct	Incorrect	I do not know
University students			
Barbers			
Truck drivers			
Soldiers			
Teachers			
Health workers			

B. 29. Is it correct or incorrect that the conditions listed below are considered as viral/fungal infections associated with HIV infection?

Manifestation	Correct	Incorrect	I do not know
Candidiasis			
Kaposi's sarcoma			
Parotid enlargement			
Hairy Leukoplakia			
Carcinoma			
Oral ulcerations			
Herpes zoster			
Acute gingivitis			

B.30. is it correct or incorrect that the following drugs are **antifungal drugs** used in treatment of the fungal infections associated with HIV-infection?

The drug	Correct	Incorrect	I do not know
Nystatin			
Acyclovir			
Chlorhexidine			
Amphotericin			
Fluconazole			
Co-trimoxazole			
Tetracycline			

Part (C): In the following we ask some question about your experience with HIV/AIDS infected people and your opinion about HIV/AIDS positive people in general. Choose the response alternative that fits you the best and put a tick in the corresponding box. Please answer all questions)

C.1). Have you ever participated in the clinical treatment of a HIV/AIDS infected patient?

- 1) Yes.
- 2) No
- 3) I do not know

C2) Do you know personally a person who is HIV positive?

- a. yes
- b. No
- c. I do not know

C3). Do you know personally any person who is sick of AIDS?

- 1) Yes
- 2) No
- 3) I do not know

C4) Do you know any person who has died because of AIDS

- 1) Yes
- 2) No
- 3) I do not know

C.5. Have you been vaccinated against Hepatitis B virus? (Why this question)?

- 1) Yes.
- 2) No.

If yes, when did you have your last vaccine? Year.....

C.6. If a member of my family became sick with HIV/AIDS virus, I would be willing to care for him or her in my household?

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

C.7. If a member of my family became sick with HIV/AIDS virus, I would want it to remain a secret

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

I would go and visit a friend if I knew that he/she had got the AIDS virus.

- 1 Strongly agree
- 2 Agree
- 3 Neither agree nor disagree
- 4 Disagree
- 5 Strongly disagree

Patients with the AIDS virus should be allowed to attend general dental practices.

- 1 Strongly agree
- 2 Agree
- 3 Neither agree nor disagree
- 4 Disagree
- 5 Strongly disagree

I would continue to be friend with someone who has got the AIDS virus.

- 1 Strongly agree
- 2 Agree
- 3 Neither agree nor disagree
- 4 Disagree
- 5 Strongly disagree

C.8. If a dentist/medical doctor/dental hygienist has the HIV/AIDS virus but is not sick then they should be allowed to continue their clinical work

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

C.9. A dental and medical health care worker should have the possibility of refusing treatment to a HIV positive patient

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

C.10. HIV and AIDS patients shouldn't be treated in regular dental clinics

- 1) Strongly agree
- 2) Agree
- 3) Neither agree nor disagree
- 4) Disagree
- 5) Strongly disagree

Section D: In the following we present statements regarding your willingness to perform surgical treatment (e.g. tooth extractions) with HIV/AIDS patients in the future. Choose the alternative that fits you the best and put a tick in the corresponding box.

D.1. I intend to provide surgical treatment (e.g. tooth extractions) to patients infected with HIV/AIDS as part of my future professional work

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

D.2. I will provide surgical treatment (e.g. tooth extractions) to patients infected with HIV/AIDS as part of my future professional work

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

D.3. How likely is it that you will provide surgical treatment (e.g. tooth extractions) to patients infected with HIV/AIDS as part of your future professional work?

1. Very likely
2. Likely
3. Neither likely nor unlikely
4. Unlikely
5. Very unlikely

D.4. To provide surgical treatment (e.g. tooth extractions) to patients infected with HIV/AIDS as part of my future professional work is the **legally** right thing to do

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

D.5. To provide surgical treatment (e.g. tooth extractions) to patients infected with HIV/AIDS as part of my future professional work is **dangerous** for my health

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

D.6. To provide surgical treatment (e.g. tooth extractions) to patients infected with HIV/AIDS as part of my future professional work is a **fair** thing to do

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

D.7. To provide surgical treatment (e.g. tooth extractions) to patients infected with HIV/AIDS as part of my future professional work is a **morally** right thing to do

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

D.8. To provide surgical treatment (e.g. tooth extractions) to patients infected with HIV/AIDS as part of my future professional work is a professionally **unreasonable** thing to do

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

D.10. *All my patients* want me to provide surgical treatment - (e.g. tooth extractions) to patients infected with HIV/AIDS as part of my future professional work

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

D.11. *Community leaders/other politicians* want me to provide surgical treatment (e.g. tooth extractions) to patients infected with HIV/AIDS as part of my future professional work

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

D.12. My family wants me to provide surgical treatment (e.g. tooth extractions) to patients infected with HIV/AIDS as part of my future professional work

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

D.13. My teachers at the college want me to provide surgical treatment (e.g. tooth extractions) to patients infected with HIV/AIDS as part of my future professional work

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

D.15. It is **morally wrong** for me **not** to provide surgical treatment (e.g. tooth extractions) to patients with HIV/AIDS as part of my future professional work

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

D.16. I feel **guilty** if I do **not** provide surgical treatment (e.g. tooth extractions) to patients with HIV/AIDS as part of my future professional work

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

D.17. I get a bad **conscience** if I do **not** provide surgical treatment (e.g. tooth extractions) to patients with HIV/AIDS as part of my future professional work.

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

D.18. How **easy or difficult** is it for you to provide surgical treatment (e.g. tooth extraction) to patients with HIV/AIDS as part of your future professional work?

1. Very easy
2. Easy
3. Neither easy nor difficult
4. Difficult
5. Very difficult

D.19. To what extent do you see yourself as **capable** to provide surgical treatment () to patients with HIV/AIDS as part of your future professional work?

1. Very capable
2. Capable
3. Neither capable nor incapable
4. Incapable
5. Very incapable

D.20. How **confident** are you that you will be able to provide surgical treatment to patients with HIV/AIDS as part of your future professional work

1. Very sure
2. Sure
3. Neither sure nor unsure
4. Unsure
5. Very unsure

D.21. I believe I have the **ability** to provide surgical treatment to patients with HIV/AIDS as part of my future professional work

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

D.22. Whether or not I provide surgical treatment to patients with HIV/AIDS as part of my future professional work is entirely **up to me**

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

D.23. How much control do you have with provision of surgical treatment to patients with HIV/AIDS as part of your future professional work

- Very much control
- Control
- Some control
- Little control
- very little control

SECTION: E. *(In the following we ask questions regarding your perceived risk or fear of contracting HIV. Choose the alternative that fits you the best and put a tick in the corresponding box).*

E.1. How do you rate the risk of health care workers in general (medical doctors, dental assistants and dentists) of contracting HIV at the work place?

- 1. No risk
- 2. Slight risk
- 3. Moderate risk
- 4. Great risk

E.2. You as a dental officer student - How do you rate your own risk of contracting HIV when dealing with patients?

- 1. No risk
- 2. Slight risk
- 3. Moderate risk
- 4. Great risk

E.3. Compared to other people of same age and gender - how do you perceive your risk of sometimes during your lifetime getting HIV/AIDS?

- 1. Much greater than others
- 2. Greater than others
- 3. Same risk as others
- 4. Less risk than others
- 5. Much less risk than others

E.4. I will eventually be infected if I treat HIV-positive patients often

- 1) Strongly agree
- 2) Agree
- 3) Neither agree nor disagree
- 4) Disagree
- 5) Strongly disagree

E.5. I always take special precautions for HIV-infected patients regarding infection control in dental clinics.

- 1) Strongly agree
- 2) Agree
- 3) Neither agree nor disagree
- 4) Disagree
- 5) Strongly disagree

E.6. I always take my standard precautions for HIV-infected patients

- 1) Strongly agree
- 2) Agree
- 3) Neither agree nor disagree
- 4) Disagree
- 5) Strongly disagree

E.7. I fear contracting HIV-infection from my routine work

- 1) Strongly agree
- 2) Agree
- 3) Neither agree nor disagree
- 4) Disagree
- 5) Strongly disagree

University of Science & Technology
Faculty of Dentistry

**استبيان لمرضى الأسنان (مقابله)
طلب مشاركة في دراسة مرضى الأسنان**

نطلب من سيادتكم المشاركة في هذه الدراسة التي تهتم بالعلاقة بين فيروس و مرضى فقدان المناعة المكتسب وعلاج الأسنان .

تتكون الدراسة من جزئين:

1/ مقابلة

2/ تقييم سريري للحالة الراهنة للأسنان وفحص لعابي لتوضيح علاقة الحالة مع مرضى فقدان المناعة المكتسبة .

هذه الدراسة هي جزء من مجهوداتنا لتحسين خدماتنا وتقديم المعلومات الضرورية لتخطيط وتطبيق السبل الأمانة لعلاج الأسنان للشعب السوداني .

يعتبر علاج الأسنان من الوسائل المحتملة لنقل الإصابة بفيروس فقدان المناعة المكتسب عليه نحن ملزمون بتقديم المعلومات للتخطيط والتطبيق العملي لوسائل الحماية ومنع نقل الفيروس.

مشاركاتكم هي طوعيه والمعلومات المقدمة تعامل وتخطيط بسريه تامه . كما يمكنكم ترك الدراسة في أي وقت دون ترتيبات على ذلك . سيتم عمل قائمه لربط رمزكم التعريفي بالاسم وذلك لغرض تنظيم وإدارة الدراسة. سوف تعامل هذه اللائحة بسريه تامه كما سيتم التخلص منها تماماً عند الانتهاء من جمع المعلومات . نتائج هذه الدراسة سوف تكون متاحة لغرض الجودة في علاج الأسنان. مشاركتكم تدعم ضبط الجودة في تقديم الخدمات لمرضى الأسنان كما أنها تقوى وتدعم حماية المستخدم.

نشكر لكم مشاركتكم المقدره في هذا البحث.

إقرار

اقر ان الموقع أدناه انه تم إعلامي بكامل أهداف هذا البحث ووافقت طوعاً على المشاركة . تدعم هذه المشاركة القضاء على فيروس و مرض فقدان المناعة المكتسب

توقيع المشارك التاريخ

كما اقر انه سوف يتم إعلامي بنتائج هذه الدراسة.

توقيع المشارك.....

الجزء (أ) دراسة إحصائية الزمن الاسم

1- العمر

2- السكن:

1/امدرمان 2/الخرطوم

3/بحري 4/أخرى

3 – الجنس:

1 / رجل 2/ امرأة

4 – المستوى التعليمي :

1/ ابتدائي 2/ ثانوي 3/ جامعي 4/ فوق الجامعي

5 – العمل :

1/ تقني 2/مكتبي 3/عامل 4/ أخرى 5/عاطل

6- الدخل الشهري :

7- الحالة الاجتماعية:

1/ عازب 2/ متزوج 3/ مطلق 4/ خاطب 5/ أخرى

8- هل سافرت داخل السودان نعم لا

9- هل سافرت خارج السودان نعم لا

الجزء (ب) مصدر معلومات : من الجزء التالي سوف نسأل عن الوسائل للحصول على معلومات عن فيروس ومرض فقدان المناعة المكتسب . الرجاء اختيار إجابة واحدة والإجابة على جميع الأسئلة.

1- كم من المعلومات المتعلقة بفيروس ومرض فقدان المناعة المكتسب حصلت عليها عن طريق الراديو و التلفزيون؟

1/ قليل 2/ بعض 3/ لا معلومات 4/ كثير 5/ كثير جداً

2- كم من المعلومات المتعلقة بفيروس ومرض فقدان المناعة المكتسب حصلت عليها من المجلات / الكتب ؟

1/ قليل 2/ بعض 3/ لا معلومات 4/ كثير 5/ كثير جداً

3- كم من المعلومات المتعلقة بفيروس ومرض فقدان المناعة المكتسب حصلت عليها من الأصدقاء / الأقارب ؟

1/ قليل 2/ بعض 3/ لا معلومات 4/ كثير 5/ كثير جداً

4 - كم من المعلومات من المعلومات المتعلقة بفيروس ومرض فقدان المناعة المكتسب حصلت عليها من عمال صحة (أطباء / أطباء أسنان /مرضين) ؟

1/ قليل 2/ بعض 3/ لا معلومات 4/ كثير 5/ كثير جداً

الجزء (ب) المعرفة: من الجزء التالي سوف نسأل عن طريق الانتقال والحماية من فيروس ومرض فقدان المناعة المكتسب الرجاء اختيار إجابة واحدة والإجابة على جميع الأسئلة.

5 - أمن للحماية من فيروس ومرض فقدان المناعة المكتسب:

1/ لا أوافق بشده 2/ لا أوافق 3/ لا إجابة 4/أوافق 5/ أوافق بشده

6- ينتقل فيروس ومرض فقدان المناعة المكتسب عن طريق النقل غير الآمن للدم:

1/ لا أوافق بشده 2/ لا أوافق 3/ لا إجابة 4/أوافق 5/ أوافق بشده

7 - ينتقل فيروس ومرض فقدان المناعة المكتسب عن طريق استعمال المواد الحادة الملوثة:

1/ لا أوافق بشده 2/ لا أوافق 3/ لا إجابة 4/أوافق 5/ أوافق بشده

8- ينتقل فيروس ومرض فقدان المناعة المكتسب عن طريق مصافحة أيدي المصابين :

1/ لا أوافق بشده 2/ لا أوافق 3/ لا إجابة 4/أوافق 5/ أوافق بشده

9- ينتقل فيروس ومرض فقدان المناعة عن طريق الأكل مع المصابين:

1/ لا أوافق بشده 2/ لا أوافق 3/ لا إجابة 4/أوافق 5/ أوافق بشده

10 - صحيح أم غير صحيح ان المجموعات المهنية التالية تعتبر من اكثر المجموعات المعرضة للإصابة:

لا أدرى	غير صحيح	صحيح	المجموعة
			طلاب الجامعات
			حلاقين
			جنود
			مساجين
			عمال صحة

الجزء (ت) :ملاحظة الإصابة والتعامل مع ذلك . من الجزء التالي نسأل عن موافقتك أو عدم موافقتك على بعض الإفادات . الرجاء إجابة واحدة والإجابة على جميع الأسئلة.

1- كيف تقيم خطر ملازمة الفيروس لا مكان عمال صحة على الصعيد العام (أطباء عموميين, مساعدين أسنان , أطباء أسنان)

1/ لا خطورة 2/ خطورة طفيفة 3/ خطورة متوسطة 4/ خطورة كبيرة

2- أنت كمرضى كيف تقيم خطر إصابتك بالفيروس عند الخضوع لأي علاج أسنان:

1/ لا خطورة 2/ خطورة طفيفة 3/ خطورة متوسطة 4/ خطورة كبيرة

3- مقارنة أشخاص آخرين من نفس العمر و الجنس كيف تلمس احتمالية تعرضك بالفيروس ومرض فقدان المناعة المكتسب خلال حياتك :

اقل عرضه كثيراً من الآخرين

نفس نسبة التعرض

اكثر عرضه كثيراً من الآخرين

اقل عرضه من الآخرين

اكثر عرضه من الآخرين

4 – لا يوجد احتمال ان أصاب بفيروس ومرض فقدان المناعة المكتسب :

1/ لا أوافق بشده 2/ لا أوافق 3/ لا إجابة 4/أوافق 5/ أوافق بشده

5 – يعتبر مرض فقدان المناعة المكتسب اخطر مرض في السودان :

1/ لا أوافق بشده 2/ لا أوافق 3/ لا إجابة 4/أوافق 5/ أوافق بشده

6- سوف اذهب لزيارة صديق إذا علمت انه , أنها مصاب بمرض فقدان المناعة المكتسب:

1/ لا أوافق بشده 2/ لا أوافق 3/ لا إجابة 4/أوافق 5/ أوافق بشده

7- إذا أصيب أحد أصدقائي بمرض فقدان المناعة المكتسب سأظل صديقاً له :

1/ لا أوافق بشده 2/ لا أوافق 3/ لا إجابة 4/أوافق 5/ أوافق بشده

ت-8- إذا أصيب أحد أفراد عائلتي بمرض فقدان المناعة المكتسب سأود ان أبقى ذلك سرا :

1/ لا أوافق بشده 2/ لا أوافق 3/ لا إجابة 4/أوافق 5/ أوافق بشده

9- إذا أصيب أفراد عائلتي بمرض فقدان المناعة المكتسب سأعمل طوعاً على الاهتمام به :

1/ لا أوافق بشده 2/ لا أوافق 3/ لا إجابة 4/أوافق 5/ أوافق بشده

10 – الأشخاص المصابين بمرض فقدان المناعة المكتسب يجب السماح لهم بالخضوع لعلاج الأسنان على وجه العموم :

1/ لا أوافق بشده 2/ لا أوافق 3/ لا إجابة 4/أوافق 5/ أوافق بشده

11- إذا كان الطبيب العمومي أو طبيب الأسنان حاملاً فقط بفيروس فقدان المناعة المكتسب يجب السماح له بمزاولة عمله:

1/ لا أوافق بشده 2/ لا أوافق 3/ لا إجابة 4/أوافق 5/ أوافق بشده

12- سأواصل ارتياد نفس عيادة الأسنان بعد عملي بعلاج مرضى مصابين بفيروس فقد ان المناعة المكتسب بها:

1/ لا أوافق بشده 2/ لا أوافق 3/ لا إجابة 4/أوافق 5/ أوافق بشده

13 – هل تعرفت شخصياً على حامل لفيروس فقدان المناعة المكتسب ؟

1/ نعم 2/ لا 3/ لا اعلم

14- هل تعرفت شخصياً على مصاب بفيروس فقدان المناعة المكتسب ؟

1/ نعم 2/ لا 3/ لا اعلم

10 – هل تعرف شخص توفي بسبب إصابته بمرض فقدان المناعة المكتسب؟

1/ نعم 2/ لا 3/ لا أدري

القسم (ث) أسئلة متعلقة بالعلاقة بين صحة الفم ومستوى الحياة العامة.

1- خلال الـ 6 اشهر الماضية كم من المرات عانيت من مشاكل تتعلق بالفم والأسنان مما نتج عنه صعوبة في الأكل ومضغ الطعام؟

1/ ولا مره 2/ اقل من مره في الشهر 3/ مره أو مرتان في الشهر

4/ مره أو مرتان في الأسبوع 5/ تقريباً أو كل يوم

3- خلال الـ 6 اشهر الماضية كم من المرات عانيت من مشاكل تتعلق بالفم والأسنان مما نتج عنه صعوبة في نظافة الأسنان :

1/ ولا مره 2/ اقل من مره في الشهر 3/ مره أو مرتان في الشهر

4/ مره أو مرتان في الأسبوع 5/ تقريباً أو كل يوم

4- خلال الـ 6 اشهر الماضية , كم من مرات عانيت من مشاكل تتعلق بالفم والأسنان مما نتج عنه صعوبة في النوم والاسترخاء ؟

1/ ولا مره 2/ اقل من مره في الشهر 3/ مره أو مرتان في الشهر

4/ مره أو مرتان في الأسبوع 5/ تقريباً أو كل يوم

5- خلال الـ 6 اشهر الماضية , كم من مرات عانيت من مشاكل تتعلق بالفم والأسنان مما نتج عنه صعوبة في الابتسام , الضحك أو الخجل من إظهار الأسنان ؟

1/ ولا مره 2/ اقل من مره في الشهر 3/ مره أو مرتان في الشهر

4/ مره أو مرتان في الأسبوع 5/ تقريباً أو كل يوم

6- خلال ال 6 اشهر الماضية , كم من مرات عانيت من مشاكل تتعلق بالفم والأسنان مما نتج عنه صعوبة في إظهار الانفعالات العادية دون الإحساس بضيق؟

1/ ولا مره / 2/ اقل من مره في الشهر / 3/ مره أو مرتان في الشهر

4/ مره أو مرتان في الأسبوع / 5/ تقريباً أو كل يوم

7- خلال ال 6 اشهر الماضية , كم من مرات عانيت من مشاكل تتعلق بالفم والأسنان مما نتج عنه صعوبة في عمل أدوار رائده في المجتمع ؟

1/ ولا مره / 2/ اقل من مره في الشهر / 3/ مره أو مرتان في الشهر

4/ مره أو مرتان في الأسبوع / 5/ تقريباً أو كل يوم

8- خلال ال 6 اشهر الماضية , كم من مرات عانيت من مشاكل تتعلق بالفم والأسنان مما نتج عنه صعوبة في الاستمتاع بالاختلاط بالآخرين ؟

1/ ولا مره / 2/ اقل من مره في الشهر / 3/ مره أو مرتان في الشهر

4/ مره أو مرتان في الأسبوع / 5/ تقريباً أو كل يوم

الجزء (ج) تقارير الصحة العامة وصحة الفم / العلاجات المدركة الاحتياج / القدرة لمعرفة بعض أنواع الطعام / السلوك تجاه الحفاظ على الأسنان:

1- ما هو تقييمك لصحتك العامة ؟

1/ سيئه جداً / 2/ سيئه / 3/ لا إجابة / 4/ جيده / 5/ جيده جداً

2- كيف تقيم الحالة الراهنة لفمك وأسنانك؟

1/ سيئه جداً / 2/ سيئه / 3/ لا إجابة / 4/ جيده / 5/ جيده جداً

3- هل أنت راضى عن مظهر أسنانك؟

1/ لا أوافق بشده / 2/ لا أوافق / 3/ لا إجابة / 4/ أوافق / 5/ أوافق بشده

القسم (هـ): سلوكيات المواظبة :

1- خلال العامين الماضيين , هل ذهبت الى عيادة اسنان تتلقى علاج ؟

1/ نعم / 2/ لا / 3/ لا أدري

2- إذا ذهبت إلى عيادة أسنان خلال العامين الماضيين كم كان عدد المرات ؟

1/ مرة / 2/ مرتان / 3/ أكثر من ثلاث مرات

3- هل أنت من المدخنين؟

1/ نعم 2/ لا 3/ لا أدرى

4- هل أنت من مستخدمي التبياك؟

1/ نعم 2/ لا 3/ لا أدرى

CLINICAL ORAL EXAMINATION SHEET

1. Name.....
2. Code.....
3. Age.....
4. Gender F M.
5. Residence

A) Dentition status registration: (DMFT):

U R											U L						
18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28		

L R											L L				
18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28

Criteria and codes for dentition registration:

CODE	CRITERIA
0	Sound
1	Decayed
2	Filled with decay
3	Filled no decay
4	Missing du to caries
5	Missing any other reason
6	Fissure sealant
7	Bridge, abutment, crown
8	Un-erupted crown
9	Not recorded
T	Trauma/fracture

B) **Simplified Oral Hygiene Index:** (*Greene and Vermillion 1964*):

1) **Debris Index:**

U R		U L
16	11	26

L R		L L
16	11	26

2) **Calculus Index:**

U R		U L
16	11	26

L R		L L
16	11	26

Criteria and codes for debris:

Scores	Criteria
0	No debris or stain present
1	Soft debris covering not more than one third of the tooth surface, or presence of extrinsic stains without other debris regardless of surface area covered
2	Soft debris covering more than one third, but not more than two thirds, of the exposed tooth surface.
3	Soft debris covering more than two thirds of the exposed tooth surface.

Criteria and codes for calculus:

Scores	Criteria
0	No calculus present
1	Supragingival calculus covering not more than third of the exposed tooth surface.
2	Supragingival calculus covering more than one third but not more than two thirds of the exposed tooth surface or the presence of individual flecks of subgingival calculus around the cervical portion of the tooth or both.
3	Supragingival calculus covering more than two third of the exposed tooth surface or a continuous heavy band of subgingival calculus around the cervical portion of the tooth or both.

Request to participate in this research

We would like to request you to participate in this research. This research is regarding the HIV-infection and oral health. Our effort is aiming towards maintaining our services to the public. The role of the dentist is to prevent rather than cure. Dental services are considered as source of HIV-infection, thus we are required to maintain our knowledge and skills to prevent cross infections. The participation is voluntarily, the confidentiality of participant is secured. The results of this research are to be made accessible for the purpose of quality assurance in dental practice. The role of the citizen/public in quality assurance and consumer protection is to be strengthened and maintained by your participation. We highly appreciate your participation in the research.

The study group

CONSENT FORM

I hereby declare that I have been fully informed about the research objectives, and I agreed voluntarily to participate. This participation is to contribute in the fight against HIV and AIDS.

Signature of participant-----

Date-----

Questionnaire for Dental-patients (interview)

Section (A): Demography:

A.1. Age:

A.2. Residence.....

A.3. Gender:

- 1) Male.
- 2) Female

A.3. Education level

- 1) Primary.
- 2) Secondary.
- 3) University.
- 4) Above university

A.4. Profession:

- Technical
- Office
- Lay labour
- Others

A.5. How much is your monthly income?

From 150.000 to 500.000 SP.

From 600.000 to 1000000 SP.

More than 1000000 SP.

Don't want to say.

A.6. Marital status:

Single

Married

Divorced

Engaged

Other

A.7. If you are married, how many children do you have?

One to two.

Two to four.

More than four.

A.6. where did you lived most of your life?

1. Khartoum state
2. Northern Sudan

3. Eastern Sudan
 4. Western Sudan
 5. Southern Sudan
 6. Middle of Sudan
 7. Out of Sudan
- A.7. Did you travel inside Sudan?
- A. Yes.
 - B. No.

- A.8. Did you travel outside Sudan?
- Yes.
 - No.

Section (B): knowledge: In the following part will ask you about modes of transmission and prevention of HIV/AIDS? Please choose one answer, and answer all questions.

B.1. the following statements are about events that might increase the risk of transmission of HIV virus. Please indicate if you think those statements are correct or wrong

Mode of transmission	Correct	Incorrect	I do not know
Unprotected sexual intercourse			
Using public toilettes			
Breast milk			
Contact with infected blood			
Correct use of condoms			
Shaking hands with someone who has the virus			
A person can have the HIV virus and not show signs of disease			
A person who has the virus but looks healthy can pass it to other people			

In the following part will ask you about different sources of information about HIV/AIDS? Please choose one answer, and answer all questions.

B.3. How much information about HIV/AIDS related issues have you received *from Radio/TV?*

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

B. 4. How much do you trust the information about HIV/AIDS related issues that you received *from Radio/TV?*

- 1) Very much
- 2) Much
- 3) Some

- 4) Little
- 5) None at all

B.5. How much information about HIV/AIDS related issues have you received from the internet?

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

B.6. How much do you trust the information about HIV/AIDS related issues that you received from the internet?

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

B.7. How much information about HIV/AIDS related issues have you received from newspapers/magazines/books?

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

B.8. How much do you trust the information about HIV /AIDS related issues that you received from newspapers/magazines/books?

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

B.9. How much information about HIV/AIDS related issues have you received from friends/relatives?

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

B.10. How much do you trust the information about HIV /AIDS related issues that you received from friends/relatives?

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

B.11. How much information about HIV/AIDS related issues have you received from health care workers?

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

B. 12. How much do you trust the information about HIV /AIDS related issues that you received from health care workers?

- 1) Very much
- 2) Much

- 3) Some
- 4) Little
- 5) None at all

Section (c) norms and perceptions: in the following part will give some statements, where you will give your opinion and understanding. Please choose one answer, and answer all questions.

C.1. AIDS is the most dangerous disease in Sudan.

- 1) Strongly agree
- 2) Agree
- 3) Neither agree nor disagree
- 4) Disagree
- 5) Strongly disagree

C.2. It is unlikely that I will ever get AIDS.

- 1 Strongly agree
- 2 Agree
- 3 Neither agree nor disagree
- 4 Disagree
- 5 Strongly disagree

C.3. AIDS is a very dangerous disease.

- 1 Strongly agree
- 2 Agree
- 3 Neither agree nor disagree
- 4 Disagree
- 5 Strongly disagree

C.4. I am really afraid of getting AIDS.

- 1 Strongly agree
- 2 Agree
- 3 Neither agree nor disagree
- 4 Disagree
- 5 Strongly disagree

C.5. I would go and visit a friend if I knew that he/she had the AIDS virus.

- 1 Strongly agree
- 2 Agree
- 3 Neither agree nor disagree
- 4 Disagree
- 5 Strongly disagree

C.6. Persons with AIDS should be allowed to attend general dental practices.

- 1 Strongly agree
- 2 Agree
- 3 Neither agree nor disagree
- 4 Disagree
- 5 Strongly disagree

C.7. I would continue to be a friend with someone who has AIDS virus.

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

C.8. I would be happy to take care of a relative who has AIDS.

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

C.9. To what extent do you think poverty is a threat against your health. (very much – not at all)

1. Very much
2. Much
3. Some
4. Little
5. None at all

C.10. To what extent do you think food shortage is a threat to your health (very much – not at all)

6. Very much
7. Much
8. Some
9. Little
10. None at all

C.11. To what extent do you think AIDS is a threat to your health (very much – none at all)

11. Very much
12. Much
13. Some
14. Little
15. None at all

C.12. Do you have a relative or a friend who is infected with HIV-infection?

YES.
No.

C.13. Do you have a past dental history?

Yes.
No.

C.14. Do you normally ask about the sterilisation of instruments in dental clinics?

Yes.
No.
Don't know.

If not, why?

14.1. I have no right.
Yes.
No.
Don't know.

14.2. Doctors may not accept.
Yes.
No.
Don't know.

14.3. I do trust doctors.

Yes.

No.

Don't know.

14.4. It is not polite.

Yes.

No.

Don't know.

14.5. I haven't thought of asking.

Yes.

No.

Don't know.

C.15. Do you think you can get HIV infection from dental clinics?

Yes.

No.

Don't know.

If yes: how?

15.1. Use of non-sterilised instruments.

Yes.

No.

Don't know.

15.2. Blood and saliva drops.

Yes.

No.

Don't know.

15.3. Meeting infected persons in the clinics.

Yes.

No.

Don't know.

15.4. Malpractice of dental personnel.

Yes.

No.

Don't know.

C.16. Would you attend a dental clinic, which is attended by an HIV-infected person?

Yes.

No.

Don't know.

C.17. HIV and AIDS patients shouldn't be treated in regular dental clinics.

1) Yes.

2) No.

3) Don't know.

If yes: Why?

Because:

17.1. They can cross the infection.

Yes.

No.

Don't know.

17.2. They don't deserve the service.

Yes.

No.

Don't know.

17.3. They don't make me comfortable.

Yes.

No.

Don't know.

C.18. Would you be willing to deal/live with an HIV infected person?

Yes.

No.

Don't know.

If no: Why?

18.1. I can get the infection.

Yes.

No.

Don't know.

18.2. It is shameful.

Yes.

No.

Don't know.

18.3. It is dangerous.

Yes.

No.

Don't know.

18.4. Other reasons

Yes.

No.

Don't know.

C.19. Do you believe that HIV- is only a behavioural disease?

Yes.

No.

Don't know.

C.20. How much trust and confidence would you say that you have in dentists in infection-control?

Very much

Much

Some

Little

None at all

C.23. How much important is professional ethical conduct?

1) Very much

2) Much

3) Some

4) Little

5) None at all

C.24. How much important is Diagnosing and treating dental problems?

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

C.25. How much important is Helping to prevent dental problems?

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

C.26. How much important is Co-operating with other health professionals?

- 1) Very much
- 2) Much
- 3) Some
- 4) Little
- 5) None at all

C.27. How much important is being sensitive to how much treatment will cost?

- 1Very much
- 2Much
- 3Some
- 4Little
- 5None at all

SECTION D: Some questions regarding oral health related quality of life:

D.1. During the past 6 months – how often have problems with your mouth and teeth caused you any difficulty in eating and chewing food?

- Never
- Less than once a month
- Once or twice a month
- Once or twice a week
- 3-4 times a week
- Every, or nearly every day

D.2. what was the actual oral problem(s) that caused your difficulty with eating and chewing food?

Condition	Yes	No
Toothache		
Loose tooth		
Gum abscess		
Bad breath		
Bleeding gums		
Dry mouth		

D.3. During the past 6 months – how often have problems with your mouth and teeth caused you any difficulty in speaking and pronouncing clearly?

- Never
- Less than once a month
- Once or twice a month
- Once or twice a week
- 3-4 times a week
- Every or nearly every day

D.4. what was the actual oral problem that caused your difficulty with speaking and pronouncing clearly?

Condition	Yes	No
Toothache		
Loose tooth		
Gum abscess		
Bad breath		
Bleeding gums		
Dry mouth		

D.5. During the past 6 months – how often have problems with your mouth and teeth caused you any difficulty with cleaning teeth?

- Never
- Less than once a month
- Once or twice a month
- Once or twice a week
- 3-4 times a week
- Every or nearly every day

D.6. what was the actual oral problem(s) that caused you the difficulty with cleaning teeth?

Condition	Yes	No
Toothache		
Loose tooth		
Gum abscess		
Bad breath		
Bleeding gums		
Dry mouth		

D.7. During the past 6 months – how often have problems with your mouth and teeth caused you any difficulty in sleeping and relaxing?

- Never
- Less than once a month
- Once or twice a month
- Once or twice a week
- 3-4 times a week
- Every or nearly every day

D.8. what was the oral problem (s) that caused you difficulty with sleeping and relaxing?

Condition	Yes	No
Toothache		
Loose tooth		
Gum abscess		
Bad breath		
Bleeding gums		
Dry mouth		

D.9. During the past 6 months – how often have problems with your mouth and teeth caused you any difficulty in smiling, laughing and showing teeth without embarrassment?

- 1) Never
- 2) Less than once a month
- 3) Once or twice a month
- 4) Once or twice a week
- 5) 3-4 times a week
- 6) Every or nearly every day

D.10. was the actual oral problem (s) that caused your difficulty with smiling laughing and showing teeth without embarrassment?

Condition	Yes	No
Toothache		
Loose tooth		
Gum abscess		
Bad breath		
Bleeding gums		
Dry mouth		

D.11. During the past 6 months – how often have problems with your mouth and teeth caused you any difficulty in maintaining usual emotional state without being irritable?

- Never
- Less than once a month
- Once or twice a month
- Once or twice a week
- 3-4 times a week
- Every or nearly every day

D.12. what was the actual oral problem(s) that caused your difficulty with maintaining usual emotional state without being irritable?

Condition	Yes	No
Toothache		
Loose tooth		
Gum abscess		
Bad breath		
Bleeding gums		
Dry mouth		

D.13. During the past 6 months – how often have problems with your mouth and teeth caused you any difficulty in carrying out major work or social role

- Never
- Less than once a month
- Once or twice a month
- Once or twice a week
- 3-4 times a week
- Every or nearly every day

D.14. what was the actual oral problem (s) that caused your difficulty with carrying out major work and social role?

Condition	Yes	No
Toothache		
Loose tooth		
Gum abscess		
Bad breath		
Bleeding gums		
Dry mouth		

D.15. During the past 6 months – how often have problems with your mouth and teeth caused you any difficulty in enjoying contact with people

- Never
- Less than once a month
- Once or twice a month
- Once or twice a week
- 3-4 times a week
- Every or nearly every day

D.16. what was the actual oral problem (s) that caused your difficulty with enjoying contact with people?

Condition	Yes	No
Toothache		
Loose tooth		
Gum abscess		
Bad breath		
Bleeding gums		
Dry mouth		

SECTION E: Reported general health, oral health status/ perceived treatment needs, stated ability to eat certain foods/attitudes towards keeping teeth

E.1. how do you evaluate your general health status?

- Very good
- Good
- Neither good nor bad
- Bad
- Very Bad

E.2. how do you consider the present condition of your mouth and teeth?

- Very good
- Good
- Neither good nor bad

- Bad
- Very Bad

E.3. Are you satisfied with the appearance of your teeth?

1. Very good
2. Good
3. Neither good nor bad
4. Bad
5. Very Bad

E.4. During the previous year how often did you experience?

a) Dental pain/toothache?

- 1) very often
- 2) Often
- 3) Seldom
- 4) never

b) Tooth abscess?

- 1very often
- 2Often
- 3Seldom
- 4never

c) Dry mouth?

- 1) very often
- 2) Often
- 3) Seldom
- 4) never

d) Infected sore gums?

- very often
- Often
- Seldom
- never

e) Tooth decay?

- 1) very often
- 2) Often
- 3) Seldom
- 4) never

f) Bleeding gums?

- very often
- Often
- Seldom
- never

g) Broken tooth?

- 1) very often
- 2) Often
- 3) Seldom
- 4) never

جامعة العلوم والتقانة
University of Science & Technology
كلية طب الاسنان
Faculty of Dentistry

To the dean of Faculty of Dentistry, University of Khartoum

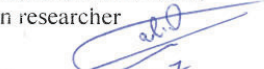
Dear Sir/Madam


We hereby introduce you to this research- HIV/AIDS concepts and aspects in dental services in Sudan- this research is an effort to strengthening knowledge, attitudes and behavior of all stakeholders of the dental services-students, dentists, and patients- in utilization and service provision.

We highly appreciate your collaboration in giving the permission in inclusion your students in the research. The results of the research will be made available for the benefits of the public.

Thanks,

Dr. Elwalid Fadul Nasir,
Main researcher


14/04/07


5/11/07
Dr. Elwalid Fadul Nasir
14/04/07

جامعة العلوم والتقانة
University of Science & Technology
كلية طب الاسنان
Faculty of Dentistry

To the dean of Dentistry Alribat National University


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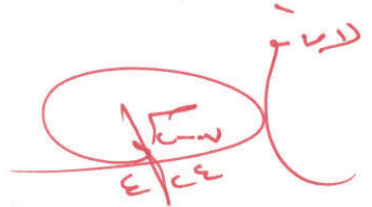
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14/04/07


د. السيد
ع/ع

جامعة العلوم والتقانة
University of Science & Technology
كلية طب الاسنان
Faculty of Dentistry

To the dean of Khartoum College for Medical Sciences

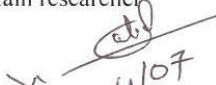
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Dr. Elwalid Fadul Nasir,
Main researcher


14/04/07

منه بالاسنان
أ. د. عبد الباقى


14/4/17

له مانع لدينا بشرط انه تحفظ حقنا الطبيه
والعلمية . وهد منه العلميه = مجموعه
للدراسه الخاصه بالاسنان والاسنانيه (الاسنان)


14/4/17

جامعة العلوم والتقانة
University of Science & Technology
كلية طب الاسنان
Faculty of Dentistry

To the dean of Faculty of Dentistry University of Medical Sciences
and Technology

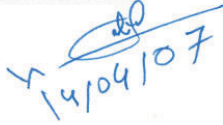
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Main researcher


14/04/07

Approved
Dr. Adam Ibrahim
A/D Dean

17/04/07

*University of Science and Technology,
Faculty of Dentistry,
Research Ethics Committee*



28.02.2010

To whom it may concern

The Research Ethics Committee of the Faculty of Dentistry, University of Science and Technology, in its meeting on 2nd March 2008, has approved the research protocol submitted by *Walid Fadul Nasir* with the title "**HIV and AIDS aspects and concepts in dental services in Sudan**".

K. Abass

*Professor Kamal Abass,
Faculty of Dentistry,
University of Science and Technology
Omdurman, Sudan.
E-mail: raoufwahab@yahoo.com*

جامعة العلوم والتقانة
University of Science & Technology
كلية طب الاسنان
Faculty of Dentistry

To the dean of Faculty of Medical Sciences and Technology
- ALRAZI -

Dear Sir/Madam

We hereby introduce you to this research- HIV/AIDS concepts and aspects in dental services in Sudan- this research is an effort to strengthening knowledge, attitudes and behavior of all stakeholders of the dental services-students, dentists, and patients- in utilization and service provision.

We highly appreciate your collaboration in giving the permission in inclusion your students in the research. The results of the research will be made available for the benefits of the public.

Thanks,

Dr. Elwalid Fadul Nasir,
Main researcher


14/10/107

الاستاذ
م. مصطفى
نورث
م. عبد الاستاذ
14/10/107





UNIVERSITETET I BERGEN

Regional komité for medisinsk og helsefaglig forskningsetikk, Vest-Norge (REK Vest)

Anne Nordrehaug Åstrøm
Institutt for klinisk odontologi
Universitetet i Bergen
5020 Bergen

Deres ref	Vår ref	Dato
	2008/2566-ANØL	10.03.2008

Ad. prosjekt: HIV/AIDS-relaterte aspekter av betydning for tannhelsetjenesten i Sudan (050.08)

Det vises til din søknad om godkjenning av forskningsprosjekt, datert 13.02.08.

Komiteen behandlet søknaden i møte den 28.02.08.

De regionale komiteene for medisinsk og helsefaglig forskningsetikk foretar sin forskningsetiske vurdering med hjemmel i Forskningsetikklovens § 4. Saksbehandlingen følger Forvaltningsloven.

Komiteen mener studien er viktig. Komiteen har følgende merknader.

- I prosjektbeskrivelsen vedlagt søknaden nevnes to delstudier, som omhandler tannlegestudenters kunnskaper og holdninger til HIV og AIDS, som ikke er oppført i hovedsøknaden. Komiteen har ingen innvendinger til gjennomføringen av disse men det må utarbeides et eget informasjonsskriv til studentene om prosjektet.
- Komiteen ber prosjektledelsen vurdere sikkerheten ved test-kitten for HIV, og gjøre en vurdering i forhold til oppfølging av både positive og negative HIV-tester
- Komiteen merker seg mangelen på sammenfallende beskrivelse av oppfølgingen av de HIV-smittede i søknaden og protokollen. Her forutsetter en at det er etablert rutiner rundt oppfølging av de HIV-smittede på en måte som praktisk sett er gjennomførbar og ivaretar de det gjelder på en god måte.
- Komiteen aksepterer de tilleggsytelser til deltakerne som er oppgitt i søknaden.
- Det er ikke beskrevet hvordan en tenker å håndtere uventede hendelser. En forutsetter her at prosjektledelsen lager rutiner som ivaretar deltakerne og registrerer alle forhold ved prosjektet gjennom hele studietiden.
- Komiteen legger til grunn at ventetiden mellom testing og resultat gjøres så kort og skånsom som mulig.
- Komiteen forutsetter at det ikke forekommer økonomiske koblinger mellom produsenten av test-kits, Bionor og prosjektledelsen.
- Det må komme tydelig frem av informasjonsskrivet at deltakelse er frivillig og at det ikke vil få konsekvenser for den behandlingen en er kommet til klinikken for å få, om en velger å trekke seg fra forsøket.
- Komiteen stiller seg bak de vurderinger sakkyndige har gjort i denne saken og ber prosjektledelsen nøye vurdere innholde i vedlagt rapport.

Komiteen merker seg at prosjektet er godkjent av University of Science & Technology, Faculty of Medicine, Kartoum.

Vedtak:

Prosjektet godkjennes på vilkår av at ovennevnte merknader tas til følge så langt det er praktisk mulig i Sudan.

Komiteenes vedtak etter Forskningsetikklovens § 4 kan påklages (jfr. forvaltningsloven § 28) til Den nasjonale forskningsetiske komité for medisin og helsefag. Klagen skal sendes REK-Vest (jfr. forvaltningsloven § 32). Klagefristen er tre uker fra den dagen du mottar dette brevet (jfr. forvaltningsloven § 29).

Komiteen ber om å få tilsendt sluttrapport evt. trykt publikasjon for studien når dette foreligger.

Vennlig hilsen


Jon Lekven
leder


Anne Berit Ølmheim
førstekonsulent

