

# Sexual Webs Model for the Examination of Unsafe Sexual Behaviors and the Spread of Sexually Transmitted Diseases Including HIV/AIDS

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## Abstract

Unsafe sex is the second most important risk factor for disability and deaths in the poorest countries and the ninth most important in developed countries. Globally, 30.8 million adults are living with HIV/AIDS and 340 million people are infected annually with sexually transmitted diseases. Unwanted pregnancies and sexually transmitted diseases including HIV/AIDS had been inexorably linked to sex, yet, there is no health behavior model focusing squarely on sexual attributes to provide analytical framework for the examination of unsafe sexual behaviors and the spread of sexual transmitted diseases including HIV/AIDS. This hinders the understanding of the roles of sexual attributes and contextual factors in influencing unsafe sex and the spread of related infections. The ‘Sexual Webs model’ has been constructed based on the individuals’ sexual attributes; levels of entanglement into the “sexual networks” known as “Sexual webs” for the examination of contextual issues influencing unsafe sexual behavior and the spread of sexually transmitted diseases including HIV/AIDS. Published qualitative research articles on sexual behaviors, and health behavior models were selected from the internet using Google and Google Scholar search. The research findings were synthesized using meta-ethnographic analysis. Research endeavors using the postulates of this model would provide better insight on the contextual issues influencing unsafe sexual behavior for policy formulation and program interventions to promote safe sexual practices.

**Keywords:** sexual webs, model, examination, unsafe sexual behavior, STDs, HIV/AIDS

## 1. Introduction

Unsafe sex is the second most important risk factor for disability and deaths in the poorest countries and the ninth most important in developed countries (Ezzati et al. 2002). Globally, 30.8 million adults are living with HIV/AIDS (WHO 2009) and 340 million people are infected annually with sexually transmitted diseases (WHO 2001). The yearly number of women with unwanted or unintended pregnancies is estimated at 80 million; 45 million commit abortion out of which 19 million are unsafe and maternal deaths from complications of unsafe abortion are about 68,000 women (WHO 2004a & b). Unwanted pregnancies and sexually transmitted diseases including HIV/AIDS had been inexorably linked to sex (Cares and Stones 1992), yet, there is no health behavior model focusing squarely on sexual attributes to provide analytical framework for the examination of unsafe sexual behaviors. This hinders the understanding of the roles of sexual attributes and contextual factors in influencing unsafe sex and the spread of related infections. The ‘Sexual Webs model’ has been constructed based on the individuals’ sexual attributes; levels of entanglement into the “sexual networks” known as “Sexual webs” for the examination of contextual issues influencing unsafe sexual behavior and the spread of sexually transmitted diseases including HIV/AIDS. This model provides postulates that would enhance the quality of research findings on sexual behaviors for informed social policies to stem unwanted pregnancies and the spread of sexually transmitted diseases including HIV/AIDS. It is better than all the previous models for the examination sexual behaviors.

The models for the examination of health risk behavior and for which most interventions are based on have focused on psychosocial and environmental factors to describe objective factual happenings and behaviors under volitional control (Bandura 1986; Becker and Maiman 1975; Careal et al. 1997; Fisher and Fisher 1992; Howard

and McCabe, 1990; Prochaska and Velicer 1997; Rogers 1975; Sutton 1997; Fishbein et al. 1991). They have ignored socio-cultural and other contextual factors (sexual attributes and 'sexual webs') that influence sexual behavior. Consequently, almost all the studies focusing on the impact of socio-cultural, economic and demographic factors on sexual behavior did not examine the interaction of these factors with sexual attributes and sexual webs to understand contextual issues surrounding sexual behaviors (Dunkle et al. 2004; Gregson et al. 1998; Pulerwitz et al. 2000; Soler et al 2000; Simon and Paxton 2004). Health behavior model that overcomes the limitations of the previous ones is required for research endeavors and program intervention to reduce unsafe sex, and the spread of sexually transmitted infections including HIV/AIDS.

A theory can be defined as a systematic way of understanding events or situation. It's consisting of a set of concepts, definitions and propositions that explain or predict these events or situations by illustrating the relationship between them (US National Cancer Institute 2005). Models themselves are not the facts but miniature representation of facts which illuminate the path of the researcher in search of these realities. A model is broader than theory- it consists of several theories brought together to explain a phenomenon or group of phenomena.

## 2. Previous Studies

### 2.1 Strength and Limitations of Health Behavior Models

Glantz et al. (1997) in their review of the articles published between 1992 and 1994 in health education, medicine, and behavioral science that used the health behavior change models for analytical framework, observed that the most commonly utilized models were Health belief Model (Becker and Maiman 1975; Janz and Becker 1984; Rosenstock 1974), The Theory of Reasoned Action/planned behavior (Montano et al. 1997; Ajzen and Fishbein 1980), Social Cognitive Theory (Bandura 1986), and the Transtheoretical model (Prochaska et al. 1994; Prochaska and Velicer 1997 cited in Redding et al. 2000). Oluwale (2005) proposes the convergence of Social learning, Diffusion of Innovation and Social network models for AIDS risk reduction in Sub-Saharan Africa, while Carael et al. (1997), and Sweat and Denison (1995) provide Social Ecological model for health promotion.

A simple overview of the models shows that the health belief model, Theory of reasoned action/planned behavior and the Transtheoretical model dwell more on the psycho-social factors at the individual level to predict health risk behavior, behavior change and maintenance of safe behavior. Prominent concepts in health belief model are perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action and self efficacy. The theory of reasoned action/planned behavior emphasizes behavioral intention, attitude, subjective and normative norms; and perceived behavioral control. The Transtheoretical model provides the stages of intentional behavior change which form a process from initiation of change to the point where change has occurred. Concepts associated with this theory are pre-contemplation, contemplation, preparation, action, maintenance, pros, cons, confidence and temptation. Others concepts are consciousness raising, dramatic relief, self-liberation, helping relationships, counter-conditioning, reinforcement management, stimulus control and social liberation (Redding 2000)

The Social cognitive theory, Convergence of behavior change models and Ecological model for health promotion recognize the active role of the environmental factors on the behavior of the individuals. Key postulate of the Social cognitive theory is reciprocal determinism which is the interaction between the individual, his or her action and the environment. The Convergence model links Social learning, diffusion of information and Social networks theories. It emphasizes that social norms are best understood and influenced at the social network level within the existing chains of communication and natural flow of information. Social ecological model for health promotion identifies intrapersonal and interpersonal factors, institutional factors, community factors and public policy at the local, state and national levels to influence the behavior of the individual.

Almost all program interventions to stem unsafe sexual behaviors are explicitly or implicitly driven by theory. The review of theory- driven interventions across the globe indicated that the emphasis on intrapersonal and interpersonal factors, the provision of skills acquisition training and the attempt to modify social norms are more effective at reducing risk behavior among participants (Diclemente and Wingood 1995). However, differences existed in effectiveness between target populations and different types of interventions. Interventions targeting sex workers were the most likely to observe increased in condom use, reduced incidence of STDs and unprotected sex (9 out of 10 studies). The effectiveness for other groups at risk was more varied. Thirteen out of 18 studies of African-American or Latino descent women were effective; 3 out of 10 studies for injecting drugs users; 1 out of 3 for partners of injecting drug users; 2 out of 3 for STDs Clinic patients; 4 out of 7 for US college students and 6 out of 14 studies for mixed gender community groups (Ickovics et al. 1998).

Despite the reported success of intervention programs among some groups at risk, there exists no compliance with behavior change initiatives among other groups. Auerbach et al (1994) states that most of the models are based on behaviors that is under intentional and volitional control, ignoring the fact that sexual behavior involves two people. It involves impulse and influenced by socio-cultural, contextual, personal and subconscious factors that may be difficult to influence. Alcohol and drug influence on sexual behavior stress the importance of understanding contextual issues surrounding sexual behavior. Some intervention programs to change risk sexual behavior produced null effect. This again pointed to the importance of understanding the relationships between context, population, approach and theoretical background. Branson et al. (1996) observed non impact among the inner city African American men and STD Clinic patients in USA. A randomized control trial among STD patients in the UK also produced a null effect. The intervention was guided by the social cognitive theory and the results showed a mild difference in self reported behavior change. James et al. (1996; 1998) suggested that community and individual interventions should address the environment in which risk behavior occurs. It clear that program interventions aiming at reducing unsafe sexual behavior should address individual, social, cultural and economic differences which the previous health models have ignored. A theoretical framework with postulates that measure these differences is required for research into contextual issues influencing sexual behaviors.

### *2.2 Changes in Sexual Behavior*

Studies have shown that sexual behaviors have changed due to secular and non secular factors in many countries across the globe (Welling et al. 2006). Attitude to sexual behavior has changed in response to socio-economic factors (poverty, education, and employment); demographic factors (age structure of population, timing of marriage, mobility and migration, seasonal labor, rural urban movement); and social disruption due to war and political instability (Mufune 2003; Zhen et al.2001). The phenomenon of transporting pornographic images from more sexual liberal societies to the conservative ones through the internet and other means of communication has impacted greatly on the social norms of those societies (Cameron et al. 2005; Simon et al.2004). Policies and legislations governing health care systems and public health strategies have also wrought changes to attitude to sex in many countries (Parker et al. 2000). The median age at first intercourse for women has fallen to about 15 years in countries of West Africa, East Africa, Central Africa and South Asia with increased levels of premarital sex (Wellings et al. 2006). Early initiation into sex is less likely to be protected against unplanned pregnancy and infections and associated with a larger number of sexual partners (Genuis and Genuis 2004; Giesecke et al. 1992; Harrison et al.2005).

Where contraception is practiced by sexual partners, it can be antidote for both unwanted pregnancies and sexually transmitted diseases including HIV/AIDS. Parker (2001) opined that the increase of unwanted pregnancies and sexually transmitted diseases indicate the gap between efforts to improve safe sexual practices and reality that is shaped by structural factors. WHO (2010) reports that in the year 2008, there were 2.7 million incidence cases of HIV/AIDS and 2 million HIV/AIDS related deaths worldwide. The global annual estimates of 80 million unwanted pregnancies and 68, 000 maternal deaths from complications of unsafe abortion (WHO 2004a &b); and the low contraceptive prevalence percent in African (23.7%), Eastern Mediterranean (42.8%) and other regions of the world(WHO 2010) need broad based rejuvenation of efforts to further understand the contextual issues surrounding unsafe sexual behaviors. To achieve this, we have constructed the sexual webs model for the examination of unsafe sexual behaviors and the spread STDs including HIV/AIDS.

### *2.3 Theoretical Conception*

The theoretical conception of this research is that sexual behavior especially unsafe sex results to unwanted pregnancies and sexually transmitted diseases including HIV. Although there are contending opinions of what sexual act constitute safe or unsafe sexual behaviors; the belief that once the sexual outcomes of pregnancy and sexually transmitted diseases including HIV/AIDS are against the initial motives of the participants, it would be considered unsafe sexual behavior. Unwanted pregnancies, STDs and HIV/AIDS are linked to sexual behaviors; therefore, a model that focuses on sexual attributes and sexual webs (a form of sexual networks with beliefs and peculiar sexual practices) would provide better insight to contextual issues surrounding unsafe sexual behaviors.

## **3. Methods**

A general search for articles was conducted through the Internet using Google search and Google scholar. The search was done using phrases such as “theories of behavior change”; “theories of sexual behavior”; “perception of AIDS and condom use”; “unsafe sex practices”; “HIV prevention”; “commercial sex workers”; “sexual behavior and sexually transmitted diseases”; “risk health behavior and HIV/AIDS”; “contraception and sexually transmitted diseases”; “programs for risk sexual behavior change” and “determinants of contraceptive method choice”. Scientific articles that met our research interest were selected from different Journals in Public Health, Social Sciences and Health Education. These articles were published between 1974 and 2010. The articles on

models of health behavior were reviewed and some of their concepts incorporated into the result of other synthesized research findings using meta-ethnographic analysis (Atkin et al.2008; Barnett-Page and Thomas 2009; Britten et al.2002; Campbell et al 2003 Noblit and Hare 1988). These led to the construction of Sexual Webs Model; 117 articles were obtained in all, but other articles that did not meet our criteria and research interest were eliminated. Qualitative papers with clear research question(s), methods and findings drawn logically from the data were selected. In process of selecting the papers, the guidelines for assessing qualitative research as suggested by Atkin et al (2008) and Campbell et al (2003) . However, the fallacy of allowing the tail to wag the Dog (Barbour 2001) was avoided. The articles selected had their study sites in Australia, Africa, Europe and America. Finally, only ten were synthesized for this work.

Table 1. Shows articles from which data was obtained

Author(s)	Study site	Methods	Sexual behavior examined
Wayomi et al (2011)	Tanzania	Focus group discussions; In-depth interviews	Parental control and monitoring of young people's sexual behavior.
Lear (1995)	USA	In-depth interviews; questionnaires; informal interviews.	Construction of risks and trust in sexual relationships among undergraduates.
Pyett & Warr (1997)	Australia	In-depth Interviews	Sex work among females
Warr & Pyett (1999)	Australia	In-depth interviews	Sex work, love & intimacy.
Hunter (2002)	South Africa	Ethnographic method	Materiality of everyday sex among men and women.
Quirk et al (1998)	USA	In-depth interviews	Unsafe protected sex among drug users.
Bauman & Berman (2005)	USA	In-depth interviews	Adolescent relationships and condom use among African American and Hispanics.
Flood (2003)	Australia	In-depth interviews	Why heterosexual men do not use condoms.
William et al (2009)	Scotland	In-depth interviews	Limits to the normalization of condom use among young women
Smith (2004)	Nigeria	In-depth interviews and participant observation	Premarital sex, procreation and HIV risk among young migrants.

#### 4. Results

The data are extractions from qualitative research findings on sexual behaviors. These articles were published in Public Health, Social Sciences and Health Education research Journals. The findings of the various authors can be construed as the exhibition of sexual attributes of the individuals. These attributes are sexual capacity, sexual motivation and sexual performance (Kinsey et al. 1948; Kinsey et al. 1953). The act of engaging in sex brings the individuals into sexual relationships. The different sexual relationships or sexual networks are conceptualized in this work as 'sexual webs'. These sexual attributes are conceived in this work as defined below.

##### 4.1 Sexual Capacity

It refers to the entire demographic, family, socioeconomic, community and global factors that influence the ability of an individual to negotiate and perform sex.

##### 4.2 Sexual Motivation

This refers to the expected benefits or any other thing(s) that encourage individuals to engage in sex. The ways individuals intend to perform sex and obtain the expected benefits are part of motivation.

##### 4.3 Sexual Performance

It refers to the things the individual actually do to enhance sex or during sexual encounters.

##### 4.4 Sexual Webs

It refers to the different types of sexual relations or sexual networks. The terms of agreement and beliefs about sex; characteristics and sexual activities amongst sexual partners may define a sexual web. Terms of agreement are implicitly or overtly expressed which constitute rituals before or during sex (beliefs, gifts, drugs or/and alcohol use, romance or foreplay etc). Intergenerational sexual relations; sexual relations amongst drug and/or alcohol users; sexual relations involving private and brothel sex workers; secret sexual relations involving married individuals, widows, and widowers; sexual relations involving unemployed or employed single individuals; and sexual relations amongst adolescents and youths may define different sexual webs; instances where a sexual partner got fed up with the other's sexual debut and recent second encounter may be indication that they belong to different sexual webs.

Tables 2a and b. Synthesis of data

Table 2a.

Author(s)	Sexual behavior	Sexual capacity	Sexual motivation	Sexual performance	Sexual webs
Wamoyi et al (2011)	Parental control & monitoring of young people's sexual behavior	Poverty; globalization (Emas; New Year; Easter; disco; pornographic movies); patriarchy.	Sexual pleasure; material needs	Secret (mostly unprotected sex); less secret sex	Those in school; those out of school.
Lear (1995)	Adolescents/young adults negotiation of sexual relationships	Levels of sexual education at home & schools; friends; gender issues	Trust; pleasure; intimacy.	With condoms; with oral contraception & no condoms; without protection; with alcohol	Casual and romantic.
Pyett & Warr (1997)	Vulnerability to AIDS among female street sex workers.	Age; experience; gender issues; poverty; policies.	Money; food; accommodation; intimacy.	With condoms; pills & no condoms; drug induced sex; sharing needles or syringes; raped.	Multiple casual partners; clients; private partners.
Warr & Pyett (1999)	Sex work, love & intimacy.	Gender issues.	Autonomy; love; romance; intimacy; trust	Pills & no condoms	Private partners; private partners had other women.
Hunter (2002)	Materiality of everyday sex between men & women	Masculinity; gender issues; support from parents ;poverty	Subsistence; high taste; true love; women sought for power; success with women(men status)	With condoms; without any protection.	Multiple partners; sugar daddies; boyfriends.

Table 2b.

Author(s)	Sexual behavior	Sexual capacity	Sexual motivation	Sexual performance	Sexual webs
Quirk et al (1998)	Unsafe protected sex among drug users.		Intimacy	Condoms for ejaculation only; limited penetration then condoms; condom split; condom came off	Primary partners; casual partners.
Bauman & Berman (2005)	Adolescents sexual relationships		Pleasure; love; intimacy; monogamy.	With condoms; with pills & no condoms; without protection.	Messing; boyfriend-girlfriend; hubby-wifey
Flood (2003)	Young men participating in unsafe sex	Perception of working & living environment as free of AIDS; masculinity; gender issues.	Sex the ultimate end of sexual practices; intimacy; pleasure; trust; monogamy.	With condoms; with pills & no condoms; without protection	Regular and casual.
William et al.(2009)	Normalization of condom use among young women		Pleasure; intimacy; trust.	With condoms; with condoms & breakage, bursting, splitting or slipping off.	Casual & boyfriends.
Smith (2004)	Premarital sex, procreation, HIV risk among young adults	Religious beliefs; gender dynamics	Procreation; intimacy; trust; love; fidelity.	With condoms; with pills, injectable & no condoms; safe periods; without any protection.	Temporary & stable.

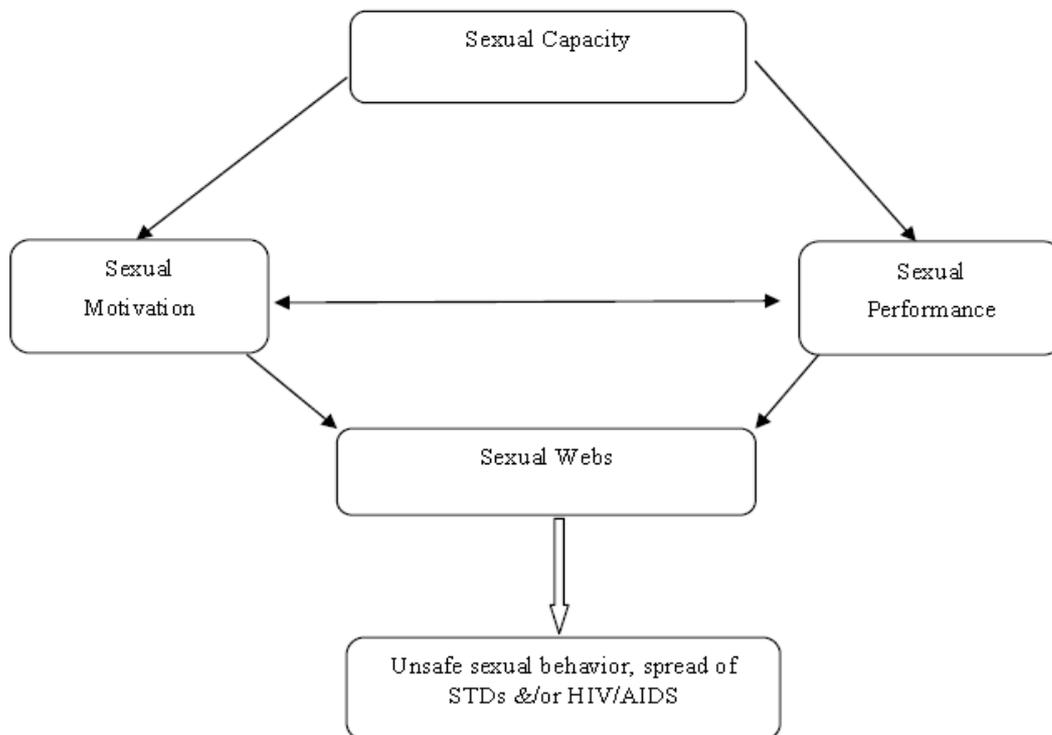


Figure 1. Sexual webs analytical framework for the examination of unsafe sexual behaviors and the spread of STDS and HIV/AIDS

Four constructs- sexual capacity, sexual motivation, sexual performance and sexual webs (Figure 1) are critical in the analysis of the spread of HIV/AIDS and sexually transmitted diseases. Masculinity; poverty; government policies; age; support from parents; the environment (schools and home); gender issues; friends; religious beliefs; perceptions of place free from AIDS are all factors that influence sexual capacity; sexual capacity in turn affects sexual motivation and sexual performance. Sexual motivation influences sexual performance and vice versa; the achievements through sexual performance (for example: money; food; drug; pleasure; intimacy) would motivate the individual to perform further sex to achieve yet unattained goals (for example, material possession for future subsistence; looking forward for marriage). Sexual motivation and sexual performance entangles the individuals into the sexual webs. Thus the entire sexual attributes of an individual link him or her to sexual webs. The actual things the individuals do that constitute ‘good’ sexual performance and better results (achievements) are difficult to discard if the individuals still desire similar positive results. If unprotected sex or prolonged drugs induced sex constitute good performance and better results, it will be difficult to discard except if the specific needs for such performance are addressed. Some of the sex workers in need of love, romance and intimacy got infected with HIV and sexually transmitted diseases through unprotected sex with their private partners (Warr and Pyett 1999). The limited penetration before condom use, and condom failure due to breakage and spillage would facilitate the spread of HIV/AIDS and other sexually transmitted diseases (Quirk et al 1999) Knowing contextual issues influencing unsafe sexual behavior among different sexual webs is critical for health risk behavior change initiatives.

The following concepts are important for the description of the characteristics and relationships among sexual webs:

4.5 Open or Infinite Sexual Web

This is a sexual web that has so many individuals that it is impossible to know each other. Sexual relations involving commercial sex workers are good example of this type of web. A migrant who starts other sexual relations in his or her new destination may extend this web to the new location.

4.6 Closed or Finite Sexual Web

This refers to a web with few individuals who know each other. An example of this may be a rich man with his wives and concubine.

#### 4.7 Positive Sexual Web

It is a web that at least a member of it is infected with HIV/AIDS or/and sexually transmitted diseases and soon others will also be infected. A community with many positive sexual webs will experience rapid spread of HIV/AIDS or/and sexually transmitted diseases.

#### 4.8 Negative Sexual Web

It is a web that none of its members is infected with HIV/AIDS or sexually transmitted diseases.

#### 4.9 Mixed Sexual Web

This is a sexual web that its members exhibit different characteristics and sexual activities that are in consonant with two or more other identified sexual webs in the community.

#### 4.10 Exclusive Sexual Partners

This is sexual relations between two or three individuals who stay together and monitor each other carefully to avoid the admission of another partner.

#### 4.11 Transitivity Sexual Partner

If  $A = B$ , and  $B = C$ , and  $C = D$ , then  $A = D$ , the law of transitivity. There would be no direct sex between partners A and D, yet, A can infect D with HIV/AIDS and other sexually transmitted diseases (See Figure 2).

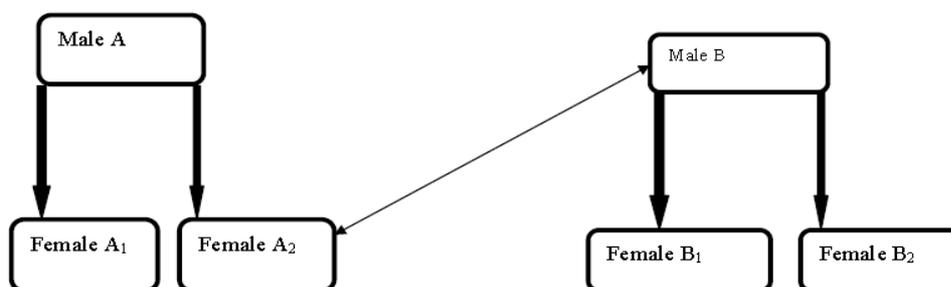


Figure 2. Illustration of transitivity sexual partner in heterosexual relation

In Figure 2 above, male 'B' has sexual relation outside his two partners with female 'A<sub>2</sub>' as shown by the black thin arrow. If female 'A<sub>1</sub>' is infected with HIV/AIDS, she will infect male 'A', and male 'A' will infect female 'A<sub>2</sub>'. Female 'A<sub>2</sub>' will infect male 'B', and Male 'B' will then infect female 'B<sub>1</sub>' and female 'B<sub>2</sub>'. Female 'A<sub>1</sub>' is a transitivity sexual partner to male 'B'; that is Female 'A<sub>1</sub>' to male 'A' to female 'A<sub>2</sub>' to male 'B'; While female 'B<sub>1</sub>' and female 'B<sub>2</sub>' are transitivity sexual partners to male 'A'; that is either female 'B<sub>1</sub>' or female 'B<sub>2</sub>' to male 'B' to female 'A<sub>2</sub>' to male 'A'. This illustration applies to the spread of sexually transmitted diseases also. The illustration is also true amongst same sex partners. In that case it will be man to man, or woman to woman.

## 5. Conclusion

Sexual webs model provides better analytical framework for examination of unsafe sexual behaviors than the previous health behavior models. Unwanted pregnancies, STDs and HIV/AIDS are linked to unsafe sexual behavior; therefore, a model focusing on sexual attributes and sexual webs would provide a better insight into the contextual issues (gender, masculinity, sexual pleasure, procreation etc) surrounding unsafe sexual behavior.

In Zambia 60% of the people newly infected through heterosexual transmission are infected within marriage or cohabitation (Dunkle et al. 2008). Whereas in Swaziland the percentage is between 50% and 65% (18); Lesotho between 35% and 62% (Khobotlo et al. 2009) and Kenya about 44% (Gelmon, 2009).

About 30% to 60% of married men and 20% to 50% of married women do engage in at least one extramarital sexual encounter (Sponaule 1989; Vangelishi and Gertenberger 2004); how do the issues of love; sexual satisfaction; sexual pleasure; procreation and others (sexual attributes) interact with types of sexual webs to influence unsafe sexual behavior in those clandestine sexual relations. Understanding the dynamics of unsafe sexual practices within the context of sexual attributes and sexual webs would be rewarding for both policy issues and program interventions.

The increase of unwanted pregnancies and sexually transmitted diseases including HIV/AIDS in some parts of the world indicate the gap between efforts to improve safe sexual practices and reality that is shaped by

structural factors (Parker 2001). Attempts to further understand the influence of these structural factors on unsafe sexual behavior using the sexual webs model would be of immense benefits.

## 6. Limitations

This model may not have incorporated all variables required for understanding unsafe sexual behavior; however, it is an improvement over the previous ones that considered partly sexual behaviors. Researchers may identify other variants based on culture or location. They can include them in the model as it best suits their research interest. Some variables may not be relevant in certain context; such variables can also be dropped.

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