

**EFFECT OF SEXUAL HEALTH EDUCATION INTERVENTION (PREPARE) ON
PROXIMAL DETERMINANTS OF SEXUAL DEBUT AND CONDOM USE AMONG
PRIMARY SCHOOL CHILDREN IN DAR ES SALAAM**

A RANDOMISED TRIAL

Prosper Faustine Njau, MD

**Master of Science (Applied Epidemiology) Dissertation
Muhimbili University of Health and Allied Sciences
October 2013**

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By

Prosper Faustine Njau

**A Dissertation Submitted in (Partial) Fulfillment of the Requirements for the Degree
of Masters of Science (Applied Epidemiology) of
Muhimbili University of Health and Allied Sciences**

**Muhimbili University of Health and Allied Sciences
October, 2013**

CERTIFICATION

The undersigned certifies that he has read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences of a dissertation entitled *Effect Of Sexual Health Education Intervention(PREPARE) On Proximal Determinants Of Sexual Debut And Condom Use Among Primary School Children In Dar Es Salaam - A Cluster Randomised Trial*, in fulfillment of the requirements for the degree of Master of Science in Applied Epidemiology of Muhimbili University of Health and Allied Sciences

.....

ELIA J MMBAGA (MD, MPH, PHD)
(Supervisor)

Date:.....

DECLARATION

AND

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I, **Prosper Faustine Njau**, declare that this **dissertation** is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.



Signature:.....

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DEDICATION

To Kinondoni Municipal Primary School Students

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ABSTRACT

Background;Sub-Saharan Africa still bear the largest burden of HIV and other Sexually Transmitted Infections(STIs) with youth below 24 years continuing being at the highest risk of infections. This group contributes the large proportion of new HIV infections, with 80% occurring in sub Saharan Africa. There is more call for innovative and effective interventions for primary preventions.

A school-based sexual behavioral intervention named PREPARE was developed to promote safer sexual and reproductive health behaviors among primary school adolescents in Dar es Salaam Tanzania. This innovative best practice intervention included classroom teaching and peer led education sessions

Objective;This study sought to evaluate the effect of PREPARE intervention on sexual debut, condom use and proximal determinants of these sexual behaviors among primary school children aged 12-14 in Dar Es Salaam.

Material and Methods;A cluster-randomized controlled trial, involving 38 (19 intervention and 19 delayed intervention) primary schools in Dar es Salaam was conducted. Using the same standardized questionnaire, data was collected at baseline and at 6 months follow-up after intervention. All analyses were carried using STATA 12 statistical software. Factor analysis was performed and scales created. Difference in difference model was used to determine intervention effect. Clustering was assumed at school level. All analyses were two tailed and type-1 error was set at 5% level.

Results;A total of 5099 students were involved in the study at baseline. Six months after the baseline a follow-up survey was conducted where 4661 (91.4%) among those who participated in the baseline survey were interviewed. Baseline characteristics of participants were comparable where no statistically significant differences between the groups were noted. 487 (10.8% SE 0.6%, 95% CI; 9.5%, 12.2%) participants report to have ever had sex; 274 (Chi square 9.12, p=0.03) were in the intervention schools. Among those who report to have ever had sex; 152 (34.2%, SE 2.6%, 95% CI 28.9%, 39.4%) reported to have ever used condom. At follow-up, 352 (8.6% SE, 0.6% CI 7.3%, 9.8%) of the respondents who had no sexual experience at baseline report to have had sex, 265(74.3%) were males (Chi-square; 127.99,

df;2 $p < 0.01$). The incidence of 86 per 1000 pupils transitioned into sex over the period of six months since baseline.

PREPARE intervention was found to significantly improve HIV transmission knowledge among females and protection knowledge for both males and females ($p < 0.01$) and reduced HIV and condom myths among female pupils.

It was also found to improve attitudes among female students (positive attitude for sex delay and positive attitude for condom; 0.205, and 0.160, $p < 0.05$ and $p < 0.01$ respectively) and reduced negative attitude towards sex delay among males.

The adjusted mean scores on perception of norms supportive of delayed sex and condom use significantly increased among females. The intervention also showed effect on self-efficacy for sex delay (0.128, $p < 0.05$) and improved communication with parents (0.094, $p < 0.05$) and friends (0.213, $p < 0.01$) among females. Intention to use condom was noted to improve among females (0.211, p -value < 0.01).

No intervention effect was noted on sexual debut and condom use between the groups. Overall more intervention effect was observed among females than males.

Conclusion; In this study we were able to explore sexual debut, condom use and proximal determinants of these sexual behaviors as purported in the theory of planned behavior. PEPRARE intervention was found to have significant effect by improving proximal determinants of sexual debut and condom use but not on actual behaviors this is likely due to the timing of our follow-up. Actual behavior changes are likely to occur after a considerable lapse of time. Overall the intervention seems to have more effect among female pupils as compared to male pupils.

INTRODUCTION

Background

The burden of HIV and other sexually transmitted infections (STIs) is well understood, more so the most affected are young people aged 15 – 24 years of age. In 2008 it was estimated that more than 5 million young people were living with HIV, 80% in sub Saharan Africa, and more than 50% of other STI's occurred among this age group.(1)This high burden is attributed to risky sexual behaviors, such as early sexual debut, multiple sexual partners, low condom use and transactional sex(2-6). On the brighter side though,data from various nations are showing a declining trend of HIV incidence, which predictably coincides with a change in sexual behavior among youths; young people are transitioning into sex much later, number of those with multiple sexual partners is going down, and many who are sexually active are using condoms, this decline though is not in a pace realistic to achieving UNGASS goal of prevention of new HIV infections(1, 7).This observed decline is stipulated to be due to prevention interventions, which is echoed by various evidences from various countries, where interventions in research settings and in few in real settings have been shown to favorably improve knowledge, attitude, beliefs, intentions and actual behaviors, with also a significant number of studies showing no improvement(8-17).With regard to actual behavior such as condom use, various studies have shown evidence to improved condom use following interventions, however evidence is minimal on interventions targeting youths(14).

Definitions

Safe sex is consensual sexual contact with a partner who is not infected with any sexually transmitted pathogens and involving the use of appropriate contraceptives to prevent pregnancy unless the couple is intentionally attempting to have a child. Therefore unsafe sex is defined as sexual behaviors, which are high-risk for contracting Sexually Transmitted Infections (STIs) or for producing pregnancy. High-risk sex is defined having sex with a non-co-resident partner, and who did not use a condom on the last occasion with that partner.(18)

Sexual initiation or sexual debut is the act of engaging in sexual intercourse for the first time. Condom use is the act of using a condom during sexual intercourse with the intention to prevent unfavorable outcomes of sexual intercourse; it being prevention of conception, or

reducing the risk of contacting sexually transmitted infections. Proximal determinants of sexual initiation/debut and determinants of condom use are characteristics of an individual or his/her surrounding environment that in one way or another influences one's engagement in sexual activity or condom use. These include knowledge, attitude, norms, myths, social expectation, self-efficacy and intentions towards a particular behavior(19-22).

Epidemiology

Unsafe sex is rampant in sub Saharan Africa, this being evidenced by early debut. sexual engagement predisposes adolescents who are yet to be equipped with skills to negotiate safer sex. Studies from Africa showed that, boys and girls engage in sexual intercourse at early age as 12 years, however boys tend to engage on average a year later than girls(6, 23, 24). A study in Mwanza showed that, about 50% of boys and about 20% of girls from standard four to six had had sex(25). Demographic and health survey of Tanzania 2010 showed that about 11.3% of adolescents had had first sexual intercourse by the age of 15 years(23). Tanzania Malaria and HIV indicator survey (THMIS) of 2012 showed that, 32% of young unmarried women and 42% of young unmarried men aged between 15 to 24 years engaged in sex. Among those engaged in sexual intercourse, 41.9% had high risk encounters(26, 27). In a Mwanza study, age at first sex is said to influence future sexual behaviors, with those debuting at later age observed to have few sexual partners and stable marital relationship(28).

Early sexual debut is also associated with increased number of sexual partners, early debut and late marriages, provides a longer sexually active period, within which one is likely to have many sexual partners(29). A study in Mwanza found that, 70% and 46% of boys and girls who had had sex had more than two sexual partner (25). THIMS of 2012 showed that, 4% of girls aged 15 to 24 years and about 15% of boys of similar age group had more than 2 sexual partners(26, 27). High risk sexual encounters are defined as sexual intercourse with non-marital or non-cohabiting partner. In 2008 it was found that, 20% and 24% of boys and girls aged between 15 to 19 years old respectively had high-risk sexual encounters. Yet less than 50% reported using condoms, in Mwanza, only 4% among those who ever had sex report to have used condoms(25, 26).

Many adolescents who are sexually active report to have sexual engagement with their peers(25);however due to economical and socio-cultural reasons, transactional and trans-generation sex is not uncommon.Data in Tanzania indicates that, 8% of girls 15 to 19 years, engaged in sexual contact with partners who were at least 10 years older than them, furthermore; 5% of boys aged 15 to 19 years, paid for sex in 2008(26)

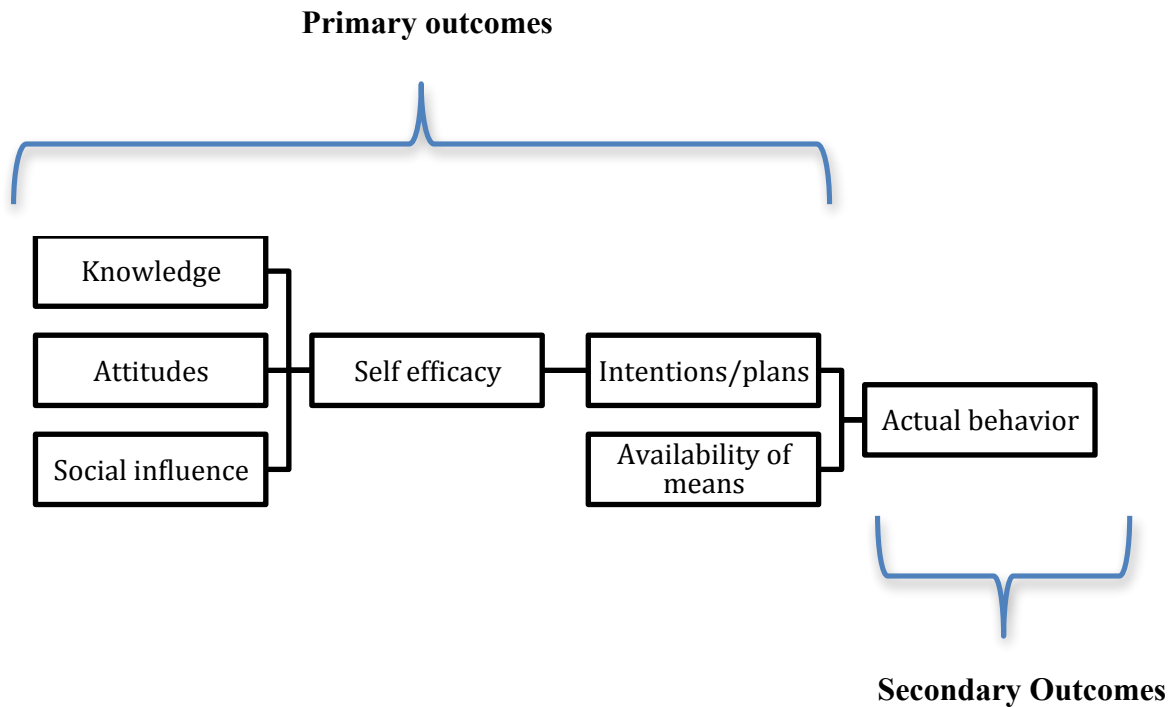
Public health implication

Due to unsafe sex, adolescents are at increased risk of contracting sexually transmitted infections, and pregnancy. With unfavorable or punitive environment both at school and community level with regards to premarital pregnancy, early pregnancy is likely to result into unsafe abortion, and school drop out. Studies in Kenya, Zambia and South Africa were found to corroborate these associations.(30-32)Six to seven percent of sexually active Tanzanians had had symptoms suggestive of STI in 2008. In Mwanza, about 1%, and 2% of primary school children were found to be pregnant and have sexually transmitted infections respectively. Matsha et.al found that, 14% of school children had had experienced pregnancy, and more than 50% of those pregnancies were illegally terminated(33). HIV prevalence rises sharply from 1% among those aged 15 to 19 years to about 6% among women aged 20 to 24 years(25, 26). This sharp rise of HIV among girls might indicate that, HIV was acquired in their teenage stage.

Conceptual framework

According to the theory of planned behavior, specific behavioral intention is considered the immediate and single major predictor of that behavior. Behavioral intentions are in turn determined by knowledge, perceived risk, attitudes toward the behavior, subjective norms regarding it, and perceived control over it(19-22).According to the model, behavioral intentions are seen as a function of three factors, namely attitudes towards the actual behavior, social influences (such as subjective norms, social expectations and peer influence), and self-efficacy expectations (the degree to which a person is convinced that he or she is able to carry out the actual behavior). Furthermore, family stability and communication were shown to predict adolescent sexual behavior, in particular sexual transitioning.(34, 35) Alcohol consumption is also implicated in early sexual debut.(34, 36)

Figure 1; Conceptual Diagram (applies to both condom and sexual debut)(37)



A conceptual framework showing the relationship between primary and secondary outcomes as per theory of planned behavior

PREPARE is a multi centered research project being carried out in three countries of United Republic of Tanzania, Uganda and Republic of South Africa.

The main aim of the project is to develop new and effective programs for the promotion of healthy sexual practices among adolescents in their adolescence using schools as a platform for implementation.

PREPARE intervention components include an enhanced competence based training program for implementing teachers and school counselors, a teacher delivered class room based intervention, a peer-education with group learning strategies intervention and strengthened linkages of intervention schools to youth friendly health services through influencing local school health care for learners policies and rules.

Literature Review

Early Sexual debut and number of sexual partners

Early sexual debut is known to predispose adolescents to unsafe sex, because at these early years of life, many have not acquired and master skills to negotiate and practice safer sex. Despite the negative effects of early sexual debut, yet early sexual debut remain a big problem in sub Saharan Africa with reported age of sexual debut as early as 12 years, and 50% are sexually active by the age of 16 years.(3, 24, 25, 28)Early debut and late marriage determines the duration of premarital relationships, also determines the number of lifetime sexual partners one is likely to have(38). Multiple sexual partners are reported in many African countries, even at teenage age.(4, 24, 25)

Condom use

Condom use is a barrier method that serves to protect against sexually transmitted infections and pregnancy. However its effectiveness depends on the consistency of it use. Although many adolescents report to have ever used condom, consistent use remains very low as evidenced by various studies in Africa where about a third of sexually active adolescents report to have used condom, with less than half reporting consistent use(4, 24, 39). Inconsistencies are explained by relationship dynamics, condom availability and skills to use condom(20, 21, 36).

Sexually transmitted infections and teenage pregnancy

Although there is high investment to fight against HIV and other sexual transmitted infections, the success of these investments hinges on successful practices of primary prevention measures against HIV infection. Evidenced by above literature, safer sex practice, and safe sexual behavior are goals yet to be realized. Tanzania demographic and health survey of 2010 showed that, about 7% of sexually active men and women self reported to have recent STI(23). Although these figures are likely to underestimate the real magnitude due to social desirability issues around STI.A study in Mwanza indicated lower STI markers among primary school children, however the risk for new infections was high as about 50% of them report to have multiple sexual partners, and more than a half of girls who were sexually active report to have been forced to have sex. Pregnancy was detected in 1% but again due to the fact

that, once one is pregnant, is expelled from school; this value might underestimate the true picture(25). However Matasha et.al found higher proportions of pregnancies and unsafely induced abortions among school children(33). Teenage pregnancy is further complicated by punitive environment both at school and at community level, forcing girls to make hard choices whether to carry the pregnancy to term, or to seek abortion. The later choice predisposing young girls to unsafe abortion and its complications, as evidenced by studies in Lusaka and Dar es salaam where more than 80% of cases with unsafe abortion were still in school(31, 40).

Problem statement and rationale

Unhealthy sexual behavior among young adolescents is still a major issue as evidenced by the reviewed literature(23, 25, 26, 28, 41-43). Young adolescents are transitioning into sex and it is very critical that interventions are designed to target adolescents at this age or earlier. As of such many researchers have tried to design interventions that target youths at this stage, albeit with mixed picture. Some have designed leveraging on schools as a gateway to intervention(6, 9, 15, 24, 44-49). Use of schools as a gateway for behavioral interventions to promote safer sexual and reproductive health has been advocated for by many scholars. It is perceived that targeting youths in schools using schools as a gateway is relatively easy to implement compared to other methods due to the fact that schools present a setting for interventions that reaches many at one time, also using primary schools targets youths who are at a verge of transitioning into sexually active adolescents, targeting this critical stage is expected to equip these youth with lasting skills and knowledge to safely negotiate through sexual transitioning and helps to shape their subsequent sexual and reproductive behavioral well being(15); in-fact targeting younger children in primary schools have been reported to be more effective than those in the older ages(50), furthermore closeness among student groups is likely to enforce good behaviors elicited by these interventions(50, 51). Against this background however many interventions using schools as a gateway for behavioral interventions have failed to demonstrate any significant effect on youth sexual and reproductive behaviors, especially those conducted in sub Saharan Africa giving a mixed picture. It is unclear whether this failure to establish any effect is down to the flaw in the intervention's content and design or lack of fidelity during implementation and evaluation of a good intervention(24). The theory and

perceived efficiency of using schools as a gateway to implementing behavior change interventions especially in limited resource settings like sub-Saharan Africa is very promising albeit need proof that it works.

To disentangle this paradox, a behavior intervention study (PREPARE) employing mixed/multifaceted information delivery approaches using primary school as a gateway was designed and tested in primary schools in Cape Town and Dar es Salaam. The intervention evaluation process is built within the implementation phase to maximize program fidelity. To evaluate the effect of PREPARE intervention, this study therefore sought to measure the effect intervention on proximal determinants of sexual initiation and condom use among school children in Dar Es Salaam. Information from this study will inform planning and designing of effective school based health education programmes in sub Saharan Africa.

Research Question

What was the effect of PREPARE intervention on proximal determinants of sexual initiation and condom use among primary school children aged 12 to 14 years in Dar es Salaam?

OBJECTIVES

1. To compare baseline socio-demographic and household characteristics of primary school aged children from intervention and control schools in Dar es salaam
2. To compare baseline knowledge, attitude, norms, myths, communication, self-efficacy, and intentions for sex and condom use respectively among primary school children from intervention and control school in Dar Es Salaam.
3. To determine the baseline proportion of sexual initiation and condom use among primary school children by intervention status in Dar Es Salaam
4. To determine the change in the determinants of sexual initiation and condom use among primary school children following the PREPARE intervention
5. To determine change in sexual debut and condom use among primary school children in Dar es Salaam following PREPARE intervention

METHODS

This study is an early evaluation of the PREPARE intervention. It utilizes all baseline and first follow-up data from the intervention

Study area and study sites

PREPARE intervention was conducted in Kinondoni district in Dar es Salaam region. Kinondoni District is the northernmost of three districts in Dar es Salaam, Tanzania, the others being Temeke (to the far Southeast) and Ilala (downtown Dar es Salaam). To the east is the Indian Ocean, to the north and west the Pwani Region of Tanzania. The 2012 Tanzanian National Census showed that the population of Kinondoni was 1.22 million(52). The area of Kinondoni is 531 km². Main economic activities in Kinondoni, are business, small and large scale industries, small scale farming and tourism.

Primary school setup in Tanzania is a seven standard system, from standard one to seven. The primary education is a term system, where there are two terms in a year. Classes are conducted during the weekdays, with exception to public holidays and school holidays. Daily school sessions are seven hours long with one-hour break. Class period are 40 minutes each.

Study design

PREPARE was a cluster randomized controlled trial (RCT) randomly selected primary schools (clusters) in Kinondoni District. RCT is the most robust design for evaluation of effectiveness of interventions. Randomise allocation nature of the design makes the intervention and control arms comparable in terms of their baseline characteristics allowing the investigator to attribute any difference observed later to the effect of the intervention.

Study population

PREPARE intervention was carried out among standard five and six primary school students aged between 12 – 14 years old in the selected primary schools in Kinondoni municipality in 2012.

Sample size and sampling procedure

Based on sample and power calculation, a total of 38 school clusters with 143 subjects in each was required. A total of 116 out of 138 schools that were eligible (public schools

implementing the mainstream Tanzania government curriculum for primary schools) were matched in terms of demographic (total learners registered) and socio-economic (urban, peri-urban locality as proxy) characteristics. The 22 ineligible schools included seven special schools (for children with various handicaps), three private schools, six new schools that did not have learners in standard five yet and the six PREPARE pilot schools. Thirty eight randomly selected schools (19 pairs) were chosen on the basis that they were representative of all eligible primary schools in the municipality. Of the selected schools, 19 were randomly allocated to the intervention arm while the remaining 19 were designated comparison (delayed intervention) schools.

The intervention

PREPARE best practices intervention involved 19 intervention and 19 delayed intervention schools. A baseline assessment of the learners in standard 5 and 6 was conducted, a broad ‘best practice’ intervention was delivered, with pairs of schools randomly assigned to receive either the comprehensive or delayed intervention. Intervention components included o an enhanced competence based training programme for implementing teachers and school counsellors, a teacher delivered class room based intervention, a peer-education with group learning strategies and strengthened linkages of intervention schools to youth friendly health services through influencing local school health care for learners policies and rules.

Classroom based intervention was delivered by science teachers, in a single 40minutes period twice a week.

Intervention Contents;

1. The Teachers’ and learners’ manuals were 13 single (40 minutes) and two double (80 minutes) sessions (i.e. 15 40 minute sessions) as follows:

Lesson 1 Self-awareness extended to 4 single sessions

Lesson 2 My sexuality (3 sessions addressing sexuality & relationships with peers, teachers and parents)

Lesson 3 Relationships (2 sessions addressing sexuality & relationships with peers, teachers and parents)

Lesson 4: Influencers of my sexuality (1 session)

Lesson 5: Risk taking and my behaviors(4 sessions)

Lesson 6: Self protection (1 session)

2. The content and number of sessions for peer-leaders manual were 9 sessions as follows

Lesson 1: life skills – broken into 5 sessions addressing self awareness, communication skills, assertiveness skills, decision-making and problem solving skills and self confidence.

Lesson 2: Puberty (time allocated changed from 60 to 90 minutes hence two sessions)

Lesson 3: Self protection skills (time allocated changed from 60 to 120 minutes hence 2 sessions)

Combined these two components were implemented in the main study as 15 40 minutes classroom sessions (total 11 hours) and 9 peer-led one hour sessions (9 hours) and provide a total of 20 hours of theory and skills for the programme targets implemented over a period of 2 ½ months.

Peer lead activities were conducted once in a week, for duration of one hour. The activities were conducted outside of classrooms. Peer leaders were a pair of a boy and a girl selected by their parents. Peer lead activities were supervised by teacher counselors.

Each intervention school made two visits to a selected youth friendly health facility. Selected youth friendly health facilities were Tandale Health Center, Bunju Health Center, and Mwananyamala hospital. In addition to health education, pupils were trained on topics that could not be taught at school, eg. In-depth discussion on sexually transmitted infections, and condom use demonstration.

Intervention fidelity

Intervention fidelity was monitored by the research team using the following methods;

1. Observations;
 - a. Class room observation; a researcher was present in almost all classroom teacher delivered sessions. Logs were used to document coverage of material contents. These contents were compared to the course materials to verify that all topics and issues were covered.

- b. Observation of peer led sessions; similar methods as in class room observation were used
 - c. Youth friendly health facility visit observations; Researchers observed delivery of materials as per each visit's objectives.
2. Student's log books; students kept journals indicating periods and materials covered in the classes and peer sessions. These were checked against course contents to ascertain content coverage.

Outcome Measures

The Primary study outcome variables measured were proximal determinants of sexual initiation and condom use;

1. Knowledge
2. Attitudes
3. Myths
4. Socio norms
5. Self Efficacy
6. Intentions
7. Communication with peers and parents

Secondary outcomes (Actual Behaviors)

1. Sexual initiation
2. Condom use

Covariates

Socio-demographic characteristics

1. Age sex
2. Living arrangements
3. Economic status
4. Parents/guardians education

Primary outcomes

Intentions

Sexintention assessment was based on students' ratings on 5-point Likert scale response to the following statement; "I intend to have sex within the next six months", Condom use intention is measured by a single item statement; "I intend to use condom next time I have sex". All responses are on a scale from absolutely not (1) to absolutely yes (5). All these intentions are measured against all participants.

Knowledge

Knowledge for both HIV transmission and condom were measured, responses were given values of Yes, No, and I don't know

Knowledge of HIV transmission knowledge

Knowledge of HIV prevention was assessed using the following statements; will you get HIV, If you have sex only once with a person who is HIV infected?, Will you get HIV is you kiss with an HIV infected person?, Will you get HIV if you have anal sex with an HIV infected person?, Is it true that, a person who look healthy can be living with HIV?

Knowledge of condom

Knowledge of condom was assessed by the following questions; does condoms have expire date? Is it true that, people are supposed to use condom only the first time they have sex? Will a girl be protected against sexually transmitted infections by using contraceptive pills or injectable contraceptives? Are you supposed to leave air bubble inside the condom while putting it on?

Myths

Condom myths

Myths on condom were measured by three statements in the likert scale; "I think that condom protects only against pregnancy and not against HIV", "I think that a real man does not use a condom", and "I think most condoms contain HIV before you use them".

HIV myths

Myths on HIV were measured by three statements in the likert scale; “I think that there is a cure for AIDS”, “I think that people living with HIV or AIDS deserve it”, and “I think that HIV is a punishment by God or the spirits”.

Attitude*Attitude towards condom*

Attitudes toward condom were further grouped into positive attitudes and negative attitudes, all were measured in a five point likert scale from 1=strongly disagree, to 5= strongly agree

Pro-Condom attitudes

Pro-condom attitudes were assessed by the following items; If I use condom during sex, it indicates that I take responsibility for myself. If I use a condom when I have sex this will make me less worried about having sex. If I use condom during sexual intercourse it shows that I care/respect my sexual partner. If I use condom, it shows that I am sexually experienced

Cons-Condom

Cons-condom attitudes were assessed by the following items; If I use condom during sex, it is not acceptable to me because of my religion. If I use condom during sex, it will feel unnatural. If I use condom during sex, I feel it will require more effort, it will disturb me. If I use condom during sex, I will feel/be nervous or awkward.

Attitude towards Sexual delay

Attitudes toward sexual delay were further grouped into positive attitudes and negative attitudes, all were measured in a five point likert scale from 1=strongly disagree, to 5= strongly agree

Pro-sexual delay

Positive attitudes towards delayed sexual initiation were assessed using the following statements; Delaying sexual debut until when I’m old will enable me to achieve my life goals. Delaying sexual debut until when I’m old will prevent me from sexual related emotional trauma. Delaying sexual debut until when I’m old will make my parents proud. Delaying sexual debut until when I’m old will reduce my chances of acquiring HIV.

Cons-Sexual delay

Negative attitudes towards delayed sexual initiation were assessed using the following statements; Delaying sexual debut until when I'm old will make me old fashion. Delaying sexual debut until when I'm old will make me frustrated. Delaying sexual debut until when I'm old will deject my partner. Delaying sexual debut until when I'm old will make me look an unsuccessful person

Subjective/social norms

Subjective norms regarding delayed sexual initiation

To measure subjective norm towards delayed sexual initiation, the students were asked to rate on a scale from disapprove strongly (1) to approve strongly (5) the following statements, Most of my friends thinks that I am supposed to wait till when I am old before starting sexual intercourse. My parents think that I am supposed to wait till when I am old before starting sexual intercourse. Most of my family members think that I am supposed to wait till when I am old before starting sexual intercourse. My sexual partner thinks that I am supposed to wait till when I am old before starting sexual intercourse.

Subjective norms regarding condom use

To measure subjective norm towards condom use, the students were asked to rate on a scale from disapprove strongly (1) to approve strongly (5) the following statements, Most of my friends thinks I am supposed to use condom during sex. My parents think that I am supposed to use condom during sex. Most of my family members think I am supposed to use condom during sex. My sexual partner thinks I should use condom during sex.

Self-Efficacy/Perceived behavior control

Perceived behavior control on delayed sexual initiation.

The students' perceived behavioralcontrol over delayed sexual initiation were assessed using the following statements in a five likert score from extremely difficult (1) to extremely easy (5). When I am drunk; waiting until when I am old to begin sex will be... When a partner is sexually matured than me; waiting until when I am old to begin sex will be... When someone

offers me money; waiting until when I am old to begin sex will be... when I am deeply romantic; waiting until when I am old to begin sex will be...

Perceived behavior control over condom use

The students' perceived behavior control over condom use were assessed using the following statements in a five likert score from extremely difficult (1) to extremely easy (5). To use condom when I have a long steady sexual partner. To use condom when I am sexually aroused is... To use condom when I am drunk it will be... To use condom when I am not feeling well (for example when I am shy) will be... To go to a nearby clinic or shop to secure condom will be...

Communication

Communication with friends

We assessed communication with friends by the following questions/statements. How often have you spoken to your friends on; how women get pregnant and give birth? Ways to prevent pregnancy? How to use condom? Sexually transmitted infections and ways to prevent them? In a four response scale ranging from 1; very often, 2; some times, 3; few times, and 4; never.

Communication with parents (frequency)

We assessed communication with parents and guardians by the following questions/statements. How often have you spoken to your parents/guardians on; how women get pregnant and give birth? Ways to prevent pregnancy? How to use condom? Sexually transmitted infections and ways to prevent them?

In a four response scale ranging from 1; very often, 2; some times, 3; few times, and 4; never.

Secondary outcomes

Reported sexual intercourse

Regarding sexual intercourse; participants were asked whether they had ever engaged in sexual intercourse "have you ever had sex by inserting your penis in a girl's vagina" or "have you ever had sex by receiving a boy's penis in your vagina". Sexual intercourse was also elicited by enquiring about anal sex "have you ever had sex by inserting/receiving penis into

the anus?” Responses were dichotomous “Yes” or “No”.

Reported condom use

Condom use was elicited by the following set of questions; “Have you ever used condom”, and “did you use condom the last time you had sex”. Responses to the first set of questions is dichotomous “Yes or No”. Condom use in the last six months is elicited by the question; “for the last six months; how many times have you used condom during sex”.

Data collection and analysis Plan

Summary of the PREPARE evaluation design

MR

I	O ₁	X ₁	O ₂
C	O ₁	O ₂	X ₂

MR – pairwise matching and randomization (schools)

I – Intervention group

C – Comparison group

O1 – Baseline data collection

O2 – First follow up data collection

X1 – Intervention

X2 – Delayed intervention

This study only utilized data at baseline and first follow-up (O₁ and O₂)

Baseline survey: The baseline study was conducted in July 2012 before the intervention started in September - November 2012. At least one member of the research team was present in the classroom during the sessions, and the same person was responsible for collecting the questionnaires. No teachers were present in classrooms during the data collection sessions.

First follow-up Survey: This follow up survey took place one week after the intervention, six months since baseline survey. The same questionnaires that were used for the baseline study were used.

Data collection procedures

Administering the questionnaires: All standard five and six students in each school were involved in the study. The questionnaire was administered during school hours. Only members of the research team were present, and they were also responsible for collecting them at the end of session. At the beginning of the session the researchers read a standardized introduction of the rationale for the study, give instructions on how to complete the questionnaires and emphasize ethical issues, particularly how confidentiality and anonymity were ensured. The

students were given an opportunity to ask questions before they started completing the questionnaires.

Linking of questionnaires: In order to link students' data for all points of measurement, the students at the base-line observation received two questionnaires with identical number. They completed one of them and put the remaining two questionnaires into an opaque envelope that they sign and return it to the research team that was stored until the follow-up observation. At the follow-up the students received the envelopes with their name, class grade and school on. They opened it and took out the second questionnaire and filled it introductory procedures similar to those during baseline survey were observed by the researcher.

Ethical Consideration:

This study is part of Phase III evaluation of PREPARE “best practice” intervention project that has been ethically cleared by the ethical review committee of Muhimbili University of Health and Allied sciences.

Permission to conduct the study was granted by Kinondoni municipal council, and participant schools administrations.

Group informed consent for learners participation was derived from school authorities (school committees) as life skills is a required component of the primary school curriculum, learners were then asked to take home consent forms for their parents to provide consent. Those who returned consent forms stating not to consent were not included in the intervention, those who did not return the forms consent was assumed through the group consent derived from school authority. However, learners also assented to participate.

The schools informed parents of the extra afternoon session that learners were participating during the intervention. In all the consent and assent forms information about the intended class room, peer education YFS visit session observations were included. In the events where sexuality and sexual health information needs were expressed by learners, the research team provided information on access to a named person at a pre-arranged youth friendly clinic in Dar es Salaam such as the youth clinic at the Infectious Disease Clinic in Central Dar es Salaam, Tandale Health center or Kimara Peers youth friendly clinics or the Mwananyamala Hospital (Main Kinondoni Municipal Hospital) supported youth friendly clinic run by the

African Medical Research Foundation at the Mwananyamala Youth Center. Students were encouraged to inform their parents or guardians prior to making contact with health services. Schools were also be provided with referral information brochures to facilitate easier access to sexual and reproductive health services by learners in the municipality.

Although discussion of sensitive issues such as sexuality and violence may cause discomfort, these issues have been widely addressed both in the media, in other research projects in Dar es Salaam and Tanzania and the formative phase of this study. A system of referral to assessment and counselling services with the social welfare office for young learners at risk was in place and is built into the project to address this potential risk. Moreover, participants were advised to respond to questions according to their own comfort level. By using trained research staff to monitor data collection, confidentiality was maximized. All learners and participants were advised prior to participating in data collection that they have the right to withdraw from the study at any time or refuse to answer any questions.

Research staffs were trained on all aspects related to confidentiality. Learners who reported being exposed to violence of a serious nature, such as rape or sexual abuse, were referred and assisted in reporting their experiences to an identified Municipal/ district social welfare officer for further assessment.

Confidentiality was ensured through careful collection and handling of data. Before any form of data collection occurred, group informed consent from school committees and assent of learners was sought. Learners signed an assent form after it was ensured that the details of the pilot intervention and its evaluation have been understood. No names were collected or linked to any of the data. During the study, only research staff had access to information about single students or classes.

Analysis;

Questionnaires for students who could not read or write were excluded at data entry stage. Baseline data is paired with follow-up data, this analysis is only of the paired data.

All analyses were done using STATA12; Cronbach's- α was used to examine the internal consistency of the scales and no items were removed. Scales were derived from the items by carrying out a principal component analysis and saving the first principal component – this lead into using as the scale the linear combination of items that maximizes the variability between respondents. Based on this information, composite scores were calculated restricting inclusion to those who have responded to at least a half of the set of questions measuring each variable. We dummy coded gender into 1= female and 0=male, class level, into 1= standard six and 0= standard five.

At baseline we determined the difference between the two groups by building a linear regression model for continuous variables and logistic regression for binary variables controlling for Age, Class level, gender, education of primary care giver and religion while adjusting for clustering at school level.

To determine the effect of PREPARE intervention we used difference in difference model(53), adjusting for baseline scores and clustering effect. Where appropriate, analyses were done separate for males and females. All analyses were two tailed and type-1 error was set at 5% level.

RESULTS

A total of 5099 students were involved in the study at baseline. Among them 2488(49.4%) were females. The overall mean age was 12.4 years and ranged from 12 to 14. At first follow-up, 4609 (90.4%) of the students who were also surveyed at baseline were interviewed. Among them 2332 (50%) were females.

Baseline Findings

Table 1; Comparison of baseline Socio-demographic characteristics of participants from intervention and control schools in Dar es Salaam

Variable		Control	Intervention	Chi- Square	p-value
Class	Five	771(34.6%)	845(36.5%)	1.66	0.19
	Six	1454(65.5%)	1471(63.5%)		
Age	12yrs	1518 (64.9%)	1597 (67.5%)	0.87	0.65
	13yrs	607 (27.1%)	608 (25.8%)		
	14yrs	168 (8.0%)	163 (6.7%)		
Sex	Female	1270 (49.7%)	1218 (49.2%)	0.17	0.69
	Male	1284 (50.3%)	1260 (50.8%)		
Religion	Christian	1318 (51.1%)	1235 (49.3%)	3.54	0.32
	Muslim	1255 (48.7%)	1260 (50.3%)		
	Traditional	3 (0.1%)	7 (0.3%)		
	Other	2 (0.1%)	1 (0.0%)		
Education level- mother	No formal education	88 (3.5%)	93 (3.8%)	3.2	0.67
	Less than primary education	153 (6.1%)	141 (5.8%)		
	Primary school education	744 (29.8%)	680 (27.9%)		
	High school education	506 (20.3%)	508 (20.9%)		
	College/university education	424 (17.0%)	442 (18.2%)		
Education level-father	I do not know	583 (23.3%)	571 (23.4%)	4.4	0.49
	No formal education	52 (2.1%)	64 (2.7%)		
	Less than primary education	125 (5.1%)	108 (4.6%)		
	Primary school education	502 (20.6%)	467 (19.7%)		
	High school education	523 (21.5%)	485 (20.5%)		
	College/university education	569 (23.4%)	569 (24.0%)		
	I do not know	660 (27.1%)	673 (28.4%)		

Table 2: Comparison of baseline primary outcomes between female and male primary school children from intervention and control school in Dar Es Salaam

Variables	Female				Males			
	Mean Difference (I-C)*	Standard Error	95% Confidence Interval		Mean Difference (I-C)*	Standard Error	95% Confidence Interval	
			Lower	Upper			Lower	Upper
Knowledge								
HIV knowledge	0.000	0.023	-0.047	0.047	0.002	0.023	-0.044	0.048
Protection knowledge	-0.012	0.016	-0.044	0.020	-0.001	0.017	-0.035	0.032
Myths								
Myths Condom	0.021	0.049	-0.078	0.121	-0.056	0.045	-0.147	0.036
Myths HIV	0.020	0.040	-0.060	0.100	-0.043	0.041	-0.126	0.040
Attitude								
Positive attitude - Condom	-0.101	0.050	-0.202	0.001	-0.021	0.055	-0.132	0.091
Negative attitude - Condom	-0.006	0.036	-0.078	0.067	0.030	0.036	-0.043	0.104
Positive attitude- Sex delay	0.009	0.053	-0.098	0.116	-0.020	0.051	-0.124	0.083
Negative attitude - Sex delay	-0.026	0.048	-0.123	0.071	0.108	0.049	0.009	0.208
Norms								
Norms - Sex delay	0.029	0.065	-0.102	0.160	0.005	0.050	-0.107	0.098
Norms - Condom	-0.083	0.056	-0.197	0.031	-0.059	0.063	-0.187	0.068
Self - Efficacies								
Self Efficacy - Condom	-0.043	0.049	-0.142	0.056	-0.063	0.043	-0.149	0.023
Self Efficacy - Sex delay	0.007	0.047	-0.089	0.103	-0.035	0.40	-0.116	0.046
Communications								
Communication parents	0.029	0.026	-0.024	0.083	0.015	0.026	-0.038	0.069
Communication - Friends	0.016	0.033	-0.051	0.083	0.045	0.030	-0.016	0.105
Intents								
Intend to delay sex	-0.008	0.054	-0.118	0.101	0.056	0.058	-0.062	0.175
Intend to use condom	-0.042	0.068	-0.180	0.096	0.008	0.069	-0.133	0.148
*	(I-C;	Intervention	Mean	Score-	Control	Mean	score)	

Table 3; Baseline proportion of sexual debut and condom use among young people aged 12-14 by intervention status

Variable		Intervention	Control	Total	X ²	p-value
Sexual debut	Yes	279 (12.2%)	221(9.5%)	500(10.8%)	9.12	0.03
	No	1977 (87.8%)	2089 (90.5%)	4066(89.2%)		
Ever use condom (among sexual debutants)	Yes	83(33.7%)	69 (34.5%)	152(34.2%)	0.03	0.87
	No	163 (66.3%)	131 (65.5%)	294(65.8%)		

(Std. Err. adjusted for 38 clusters in School)

Logistic regression				Number of obs	4609	
				Wald chi2(4)	108.79	
				Prob>chi2	0.00	
				Log pseudolikelihood	-1499.23	
				Pseudo R2	0.05	
Sexualdebut	OR	SE	z	P value	95% Conf. Interval	
Intervention status	1.35	0.18	2.24	0.03	1.04	1.75
Age	1.13	0.09	1.60	0.11	0.97	1.32
Gender	0.30	0.04	-9.75	<0.01	0.24	0.38
Class level	0.99	0.00	-2.52	0.01	0.99	1.00

Logistic regression				Number of obs	439	
				Wald chi2(4)	0.76	
				Prob>chi2	0.94	
				Log pseudolikelihood	-281.52	
				Pseudo R2	0.00	
Condom use	OR	SE	z	P value	95% Conf. Interval	
Intervention status	0.98	0.23	-0.07	0.94	0.63	1.54
Age	0.96	0.14	-0.30	0.76	0.72	1.28
Gender	0.82	0.19	-0.86	0.39	0.52	1.29
Class level	0.1.0	0.01	0.21	0.84	0.99	1.01

Socio demographic characteristics

Table 1 depicts baseline comparison of socio-demographic characteristics of study participants. There was no statistically significant difference between the two groups.

Comparison of baseline scores of proximal determinants of sexual debut and condom use

Table 2 depicts baseline comparison of scores of primary outcomes for males and females after adjusting for age, class, socio economic scores and mother's or primary care giver's education while controlling for clustering at school level.

At baseline adjusted mean score difference for negative attitude for sex delay (0.108, SE 0.014 CI; 0.009, 0.208) was found to be significant at 5% level. No significant differences were noted in other determinants (primary outcomes) at baseline.

Comparison of baseline proportions of sexual debut and condom between intervention and control schools

Table 3 depicts participants who report to have ever had sex (sexual debut) and among them those who have ever used condom. 500 (10.8% SE 0.6%, 95% CI; 9.5%, 12.2%) participants report to have ever had sex; 279 (Chi square 9.12, p=0.03) were in the intervention schools. Girls were 30% less likely to have ever had sex. (AOR 0.3, p<0.001)

Among those who report to have ever had sex; 152 (34.2%, SE 2.6%, 95% CI 28.9%, 39.4%) reported to have ever used condom.

When we modeled sexual debut, against age, gender, and class level, in a logistic regression equation, while controlling for clustering, we found that, sexual debut was more likely to be reported by males, those in higher class level (standard six) and among those in the intervention school. There was no difference with regard to condom use.

Determining EFFECT of PREPARE Intervention

Males and females are likely to demonstrate different levels of behavioral engagement and might also respond differently to interventions. We stratify comparison of change in the means scores after the intervention by sex.

Table 4; Comparison in the mean scores of determinants of sexual behaviours after the PREPARE intervention stratified by sex

Variables	Female			Male		
	Difference between groups at baseline	Difference among control group at follow-up	Intervention Effect	Difference between groups at baseline	Difference among control group at follow-up	Intervention Effect
Knowledge						
HIV knowledge (mean)	0.000	-0.072**	0.083**	0.001	-0.048**	0.039
(SE)	0.023	0.016	0.029	0.023	0.015	0.023
Protection knowledge (mean)	-0.013	-0.052*	0.099**	-0.002	-0.026*	0.068**
(SE)	0.016	0.021	0.032	0.017	0.013	0.025
Myths						
Myths – HIV (mean)	0.022	-0.010	-0.119**	-0.045	-0.022	-0.056
(SE)	0.040	0.023	0.039	0.040	0.028	0.048
Myths – Condom (mean)	0.021	0.125**	-0.152**	-0.057	0.050	-0.089
(SE)	0.048	0.030	0.047	0.044	0.037	0.047
Attitudes						
Pos attitude – Condom (mean)	-0.099	0.041	0.160*	-0.018	0.104*	0.033
(SE)	0.050	0.032	0.063	0.055	0.039	0.072
Neg attitude – Condom (mean)	-0.006	-0.004	0.004	0.032	0.003	-0.063
(SE)	0.035	0.031	0.046	0.035	0.040	0.048
Pos attitude – sex delay (mean)	0.014	0.060	0.205**	-0.025	0.017	0.094
(SE)	0.013	0.030	0.061	0.051	0.043	0.081
Neg attitude – sex delay (mean)	-0.027	-0.061	-0.004	0.105	0.055	-0.171*
(SE)	0.048	0.053	0.075	0.050	0.058	0.068
Norms						
Norms – Sex delay (mean)	0.036	-0.014	0.207*	-0.005	-0.032	0.089
(SE)	0.064	0.039	0.076	0.050	0.040	0.077
Norms – Condom (mean)	-0.076	-0.056*	0.230**	-0.057	-0.104*	0.124
(SE)	0.056	0.036	0.069	0.064	0.044	0.064

Variables	Female			Male		
	Difference between groups at baseline	Difference among control group at follow-up	Interventi on Effect	Difference between groups at baseline	Difference among control group at follow-up	Interventi on Effect
Self-Efficacy						
Self efficacy – condom (mean)	-0.042	0.065	0.094	-0.063	0.033	0.021
(SE)	0.049	0.036	0.054	0.043	0.034	0.057
Self efficacy – Sexdelay (mean)	0.008	0.094*	0.128*	-0.038	0.096*	0.007
(SE)	0.047	0.040	0.048	0.041	0.035	0.046
Communications						
Communication – parents	0.029	-0.031	0.094*	0.017	-0.016	-0.009
	0.026	0.027	0.039	0.027	0.024	0.030
Communication - Friends	0.012	-0.030	0.213**	0.044	0.045	0.005
	0.033	0.025	0.050	0.030	0.029	0.045
Intentions						
Intend to have Sex	-0.007	0.072	0.020	0.055	0.049	0.046
	0.054	0.049	0.070	0.057	0.057	0.091
Intend to use condom	-0.041	-0.132**	0.211**	0.008	-0.015	-0.009
	0.067	0.048	0.076	0.069	0.074	0.105

* $p < 0.05$, ** $p < 0.01$

Table 4 depicts intervention effect by comparing mean scores of predictor variables of sexual behaviors after intervention using “*difference by difference*” model. The estimates have been adjusted for baseline scores, and clustering at school level.

Intervention effect among females

Knowledge;

The model output indicates that without intervention, HIV knowledge and Protection knowledge gets worse over time (the difference among control group is -ve coefficient). Adjusting for clustering at school level, the intervention was noted to have a statistically significant effect of reducing decline of HIV knowledge and Protection knowledge. (Mean score difference 0.083 and 0.099, $p < 0.01$ respectively).

Myths/beliefs;

The adjusted mean score difference on myths on HIV transmission and on Condom (-0.119, and -0.152 respectively $p < 0.01$) indicates that the intervention has a statistically significant effect. Where debunking of myths was noted.

Attitudes;

The adjusted mean score difference on positive attitude for sex delay and positive attitude for condom (0.205, and 0.160, $p < 0.05$ and $p < 0.01$ respectively) indicates that the intervention has a statistically significant effect. Where positive attitude is promoted.

Perceived Socio norms;

The adjusted mean score difference on perceived socio-norms supporting delay in sexual debut and condom use (0.207, and 0.230, $p < 0.05$ and $p < 0.01$ respectively) indicates that the intervention has a statistically significant positive effect on perceived social norms.

Self- efficacy;

Although females in the intervention arm had higher scores on both self-efficacy for sex delay and condom use; only the adjusted mean score difference on self-efficacy for sex delay (0.128, $p < 0.05$) increased significantly among female participants in the intervention schools as compared to the control schools following the intervention.

Communications;

The adjusted mean scores difference on reported communication with parents (0.094, $p < 0.05$) and with friends (0.213, $p < 0.01$) increased among the female participants in the intervention schools as compared to the control schools following the intervention.

Intentions;

The model output indicates that without intervention, intention to use condom gets worse over time (the difference among control group is -ve coefficient). Adjusting for clustering at school level, the intervention was noted to have a statistically significant effect of reducing decline of intention to use condom, (Adjusted Mean difference 0.211, $p < 0.01$)

Intervention effect among males

Knowledge;

The model output indicates that without intervention, Protection knowledge gets worse over time (the difference among control group is -ve coefficient). Adjusting for clustering at school level, the intervention was noted to have a statistically significant effect of reducing decline of Protection knowledge. (Mean score difference 0.068, $p < 0.01$) while no effect was noted on HIV knowledge.

Myths/beliefs;

The adjusted mean scores on myths on HIV transmission (-0.056, $p > 0.05$) and condom (-0.089, $p > 0.05$) decreased among the male participants in the intervention schools as compared to the control schools following the intervention. This decrease in the mean scores indicates that the intervention is debunking myths however the intervention effect was not statistically significant at alpha level of 5%.

Attitudes;

The adjusted mean scores on negative attitude towards sex delay (-0.171, $p < 0.05$) decreased among the male participants in the intervention schools as compared to the control schools following the intervention. Indicating that the intervention is reducing negative attitude toward delayed sex. Changes in mean scores of other attitudes were not statistically significant.

Perceived Socio norms, self efficacy, communications and intentions

When we compared mean scores of perceived social norms, self-efficacies, communications and intentions among males, no significant difference in scores of the mentioned variables was noted after intervention. The intervention had no effect on these variables.

Sexual debut and condom use after intervention

At follow-up, 352 (8.6% SE, 0.6% CI 7.3%, 9.8%) of the respondents who had no sexual experience at baseline report to have had sex, 265(74.3%) were males (Chi-square; 127.99, df;2 p;<0.01). From baseline this gives us an incidence of 86 per 1000 pupils who transition into sex over the period of six months since baseline. Distribution of sexual initiation did not differ by intervention status (178(50.3%) for intervention versus 174 (49.7%) for control, df; 2, p=0.34).

We then build a model to determine intervention effect while adjusting for clustering at school level.

Linear regression				Number of obs	9270	
				F(3,37)	0.76	
				Prob>F	0.125	
				R-squared	0.0013	
				Root MSE	0.315	
Sexual Debut	Coeff	S E	t	P value	95% Conf. Interval	
Baseline difference	0.028	0.012	2.25	0.031	0.003	0.053
Control diff over followup	0.013	0.013	1.04	0.304	-0.012	0.038
Intervention effect	-0.013	0.018	-0.74	0.465	-0.049	0.023

No statistically significant intervention effect was noted.

Among those who report to have ever had sex at followup, 61(17.3%, SE 2.4% CI; 12.4%, 22.4%) report to have ever used condom, 50 (82%) were males. ($\chi^2 = 1.2853$ df;2 P = 0.257)

We then run a model among those who report to have ever had sex to determine the effect of intervention on condom use.

Linear regression				Number of obs	1034
				F(3,37)	3.39
				Prob>F	0.028
				R-squared	0.0059
				Root MSE	10.627
Condom use	Coeff	S E	t	P value	95% Conf. Interval
Baseline difference	0.460	1.442	0.32	0.752	-2.463 3.383
Control diff over followup	1.363	1.124	1.21	0.233	-0.914 3.639
Intervention effect	0.317	1.481	0.21	0.832	-2.683 3.318

There was no statistically significant difference between the groups with regards to condom use after intervention. Thus there was no significant intervention effect noted on condom use.

DISCUSSION

In our study we found high proportion of early sexual debutants, a significant incidence of sexual transitioning during the follow-up period and low condom use. We found that the PREPARE intervention had effect on proximal determinants of sexual behaviors where we observed significant increase knowledge, improved attitudes, norms, communication and reduced myths. To a lesser extent it was found to improve intentions. The intervention effect was predominantly among females as compared to males.

The theory of planned behavior (TPB) purports that; any behavior is most likely to occur when there are a strong intention and ability to carry out the behavior. And when there are no environmental barriers to doing so. Behavior intentions in turn are determined by attitudes, perceived social norms and self-efficacy expectations regarding behavior(19). As a result, changes in attitudes are viewed as an important goal in many sexual health programmes and intentions to engage in low-risk behaviors are often taken as a sufficient indicator of subsequent behavior(50). PREPARE intervention study is anchored on socio-cognitive theory (an extended TPB).

Sexual debut and condom use

The fact that the route of HIV transmission in Tanzania is mainly through heterosexual contact, age at first sex is an important proxy of exposure to risk of pregnancy and sexually transmitted infections (STIs), including HIV infection. People who initiate sex at an early age are typically at higher risk of becoming pregnant or contracting an STI. In our study we found about 11% of all participants have had sex, and 8.6% transition into sex over the six months of follow-up period. More than two third of them being male students. These findings appear to concur with what is reported in the Tanzania HIV and Malaria Indicator survey of 2012 where 9% and 10% of females and males respectively report to have started sex before the age of 15 years(27). Male preponderance among those who report to have had sex was also observed by various studies(6, 34, 35, 54). About half of those who reported to be sexually active, they had first sexual intercourse at ten years old or younger. This proportion of sexual debut is lower as

compared to a primary school students study in Mwanza by Todd(25); this could probably be due to the age structure of participants in our study that was between 12 and 14 years, as compared to age range of between 9 and 20 in the Mwanza study. The younger age at first intercourse could also be explained by our study participant's age structure, as various studies have shown that, the mean age of sexual debut in many African setting is around 15 years(6, 25, 34, 39), which is beyond our upper range of 14 years.

Among those reporting to be sexually active, a third of them report to have ever used condom, where more than 80% of those who report to have ever used a condom were males, although we did not observe any difference in condom use with regard to gender probably due to lack of power (small sample size of those reporting to use condom). However findings in other countries appears to indicate male domination in condom use(39).

Effect of PREPARE on determinants of sexual debut and condom use.

At baseline we found no significant difference in all but positive attitude toward sex delay among male students. This noted difference might be due to chance, and is not expected to have a bearing on subsequent follow-up observations. Other literatures also point out that statistical difference may be noted at baseline when the sample size of the study is large(55, 56). Moreover, the final analyses were controlled for all baseline variables.

In our study we found a significant improvement in knowledge on HIV and on protection and condom use among females who received PREPARE intervention as compared to those in the control group. A similar improvement in knowledge is also reported in a systematic review of various evaluation studies of health education programmes in Africa(50). Although knowledge by itself does not always indicate a change in behavior, it is viewed as an important component in any health education intervention. Similar improvement in knowledge is reported in the Memakwa Vijana study in Kisesa Mwanza, and in a World Starts With Me study, a study in Masaka Uganda, and studies elsewhere(8, 13, 15, 17, 57, 58). We observed improvement in perceived norms, reduction of myths and attitudes improvement among those in the intervention group, where positive attitude towards condom use and delaying sex was

observed, similarly we observed a decline in negative attitudes among the intervention group. Improvement in attitudes, discrediting of myths and improvement of perceived norms are consistent with studies elsewhere (8, 10, 15, 57). Few interventions have demonstrated improvement in self-efficacy. It is not surprising that we only find a significant improvement of self-efficacy for delaying sex among females in our study. This could be due to the fact that, girls are more likely to opt for abstinence compared to boys. A study in Kenya also found that girls demonstrated more efficacy on abstinence as compared to boys (15). However, on average as noted in other studies, those receiving interventions scored higher in self-efficacy than the controls (15). Communication with peers and with parents is also regarded as one of the gateway to imparting appropriate sexual and adolescent health education, a study by Mmbaga et al. revealed that those with good communication with their parents or guardians were less likely to start sex early (34). PREPARE intervention also aimed at improving communications, in our study we found that females who received PREPARE intervention did well in communication with their peers and their parents this was not observed among males. This improvement in communication is also reported by a study in Kenya, where after intervention, communication appeared to improve among those who received the intervention as compared to those who did not (15). A similar study in Kenya also found that intervention improved intentions to abstain and intention to use condom, further more there was an actual improvement in sexual behaviors, where there was less transition into sex and more condom use among those in the intervention group as compared to those in the control group (15), however in our study we found a different effect, we found that the intervention significantly increased intention to use condom among female. And when we compared actual sexual behaviors, no significant difference was noted between the groups. It could be that the reported behavior immediately after intervention actually took place before the intervention. Changes in sexual behavior were therefore not expected immediately at the time of our survey. This observation is also corroborated by a study in Zambia where effect of behavior was not apparent immediately after intervention (9). Only a small effect size was found to be achieved by the intervention on all variables of interest. Overall we observed the intervention to be working more among females than among males, this differential intervention effect might be

influenced by other cultural factors. For example, Africa norms are more lenient to male's sexual behaviors than female's. Likewise girls are likely to take into heart sexual health education due to higher risks of pregnancy, and STIs associated with sexual behaviors as compared to boys. It is not uncommon for males to start sex early, or to engage in risky sexual behaviors. This might explain why we observe the intervention to work more among females than among males.

LIMITATION AND STRENGTH OF THE STUDY

This was a randomized controlled trial, where we had 19 schools randomly assigned in the intervention arm and 19 in the control arm, location and distance of the schools ensured minimum contamination if any. Fidelity of implementation of the program was regularly monitored by verifying sessions covered through review of student's log books and periodic supervision of session by research team, where a researcher was present when programme materials were taught in the class and in peer sessions. Our study did not have any biological outcome.

A common setback of behavioral intervention studies is that in the absence of biological markers/outcomes; self reported data on behavior is subject to reporting bias. It is not uncommon for participants to report on socially desirable behavior while they engage to the contrary, this could be even more so among those in the intervention arm, as the programme materials intend to teach participants on appropriate sexual behavior and empower them to practice these safer sexual behaviors. This might overestimate the effectiveness of the intervention. But this is not what we observed in our study. Due to these reasons, strong positive results are less likely to be seen even if our study had to have biological outcomes.

The planning and implementation of PREPARE intervention was as optimal and rigorous as possible, but several other limitations deserve mention. Although teachers and peers were rigorous trained and monitored, the small size of the research team made it impossible to observe all sessions. At some schools peer sessions were after class hours and to some extent this caused some absenteeism, as students tend to flee home after classes. This might have an effect on completeness of the intervention and therefore its effectiveness.

Lack of follow-up of dropouts caused some loss of power, but it probably did not bias the results. Dropout rates did not differ between the two arms of our study. However, the major setback is that this study is only reporting effects immediately after the intervention. This limits our capacity to estimate delayed outcomes, this could explain our inability to detect effect of the intervention on actual behaviors that takes some considerable time to occur. Further more we cannot study the durability of effects that we have observed unless a repeated

survey is done at some time later.

PREPARE intervention was conducted in Dar Es Salaam region only, given socio-economic dynamics of the region as compared to other regions in Tanzania, effects of this study can not be generalized to represent the expected effects elsewhere in the country.

CONCLUSION

In this study we were able to explore sexual debut, condom use and proximal determinants of these sexual behaviors as purported in the theory of planned behavior. PEPRARE intervention was found to have significant effects by improving proximal determinants of sexual debut and condom use. The intervention seems to be working more among female pupils as compared to male pupils.

RECOMMENDATIONS

- Risky sexual behaviors such as early sex debut and inadequate condom use do exist even among young primary school children. There is an urgent need to intervene
- Effect of PREPARE intervention on proximal determinants of sexual behavior shows that the intervention is effective. However effects of the intervention is more among females, there is a need to explore more on what might work best with male pupils, may be a change on how the materials are delivered to make them more interesting among males.
- Effect on actual behavior was not observed in the first follow-up survey. With a background knowledge that changes in actual behavior takes some time to register, repeat follow-up surveys are recommended to determine if the intervention has an effect on actual sexual behaviors.
- Acceptability and flexibility that we observed during the implementation of the intervention, makes PREPARE a commendable sexual and adolescent health intervention in primary school settings in Tanzania shouldwe find PREPARE effects on actual behaviorsare as promising as our initial results.

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