NON-LINEAR DECOMPOSITION OF CHANGES IN SEXUAL BEHAVIOUR AMONG YOUTH IN FOUR SUB-SAHARAN AFRICAN COUNTRIES, 2004-2018

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CERTIFICATION

I certify that this project was duly carried out directly under my supervision and also meets the regulations governing the award of the degree of M.Sc. (Biostatistics) in the Department of Epidemiology and Medical Statistics, Faculty of Public Health, College of Medicine, University of Ibadan.

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ATTESTATION

I understand the nature of plagiarism, and I am aware of the University of Ibadan policy on this. I certify that this dissertation reports work by me is not plagiarized content and has not been presented to any other university body

Signature…… Date……..

Name: Adeleke, Nafisat Kehinde

DEDICATION

This dissertation is dedicated to Almighty God whose infinite mercy and grace sustained me throughout the duration of the study. Also, to my beloved daddy for his unwavering support.

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I am deeply indebted and grateful to almighty God for His sufficient grace and mercy.

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ABSTRACT

Sexual behaviour functions primarily to assure reproduction, and sexual activity also contribute to HIV and sexually transmitted infections. The quest to prevent HIV, STIs, and unplanned pregnancy among youth in Sub-Saharan Africa make it necessary to regularly assess if there are changes in sexual behaviour. This study aims to investigate factors influence changes in sexual behaviour among youth in four Sub-Saharan African countries.

Demographic Health Survey (DHS) data for two-time points with a minimum of 10years interval for four selected countries in Sub-Saharan Africa between the year 2004 to 2018 was used for this study. Chad, Uganda, Lesotho, and Nigeria were the selected countries with a total sample size of 74,138 for the youths age 15-24years age. Analysis for males and females were done separately, and the percentage change in five sexual behaviour indicators and predictors were determined. The preceding and recent surveys were merged for each country and gender before the non-linear decomposition technique was applied. The non-linear decomposition technique was used to assess the gap between the changes in characteristics effect and the contribution of socio-economic characteristics, culture/environment, media exposure to the gap for two sexual behaviour indicators with the highest magnitude of change used in each country.

The result showed that each country and gender have different percentage changes in sexual indicators, with premarital sex having the highest magnitude of changes for both males (115.5%, 26.9%,72.8%,46.1%) and female (26.4%,44.4%,67.4%,30.4%) in all the four selected countries (Chad, Uganda, Lesotho, and Nigeria). Lesotho's non-linear decomposition models showed a decrease of 11.4% and 6.1% in multiple sexual partners and premarital sex among the male youths between 2004 and 2014. Socio-economic characteristics made the largest contribution to reducing the two indices of sexual behaviour, explaining 54% and 90% of the endowment effect. Also, there was a substantial increase of 29.5% in multiple sexual partners and a decrease of 32.5% in premarital sex among the female youth between the two surveys. Socio-economic made the largest contribution to

the effect, explaining 57% and 194% of the endowment effect for multiple sexual partners and premarital sex, respectively. But for Nigeria, there was an increase of 10.5% in multiple sexual partners among male youths between 2008 and 2018. Media exposure made the largest contribution to this rise, explaining 444% of the endowment effect. For premarital sex, there was a substantial decrease of 23.1% between the surveys. Culture /environment made the largest contribution to the decline, explaining 135% of the endowment effect. A similar pattern was observed among the female youths.

Non-linear decomposition was able to identify and explain the separate contribution of group differences in assessable characteristics. The analysis showed changes in sexual behaviour among the youths in four selected countries, and those changes were explained by changes in sexual indices across the countries and the explanatory factors.

Keywords: Non-linear decomposition, indicators of sexual behaviour.

Word count: 479

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Decomposition method is useful for explaining and identifying the separate contribution of group differences in assessable characteristics. It is based on regression analysis of the relationship between the outcome variable of interest and its predictors.

Decomposition was popularized by the work of Oaxaca (1973), who applied the technique to explain the difference between the mean values of a variable, usually the logarithm of earnings for two groups based on the coefficients obtained from two group-specific regressions. The difference is expressed in term of two parts that contribute to divergence in group mean. Those two parts are explained part or composition effect due to difference in mean characteristics of the group and unexplained part or structured effect due to difference in the estimated coefficient in the group equations.

The goal of Oaxaca Blinder decomposition is to partition the part that is due to group differences in the mean value of the explanatory variable within the groups and group differences in the effect of the explanatory variable. Oaxaca Blinder method was initially limited to continuous dependent variable, but it has been extended to use the method to decompose group differences using non-linear models such as the probit and logit models (Fairlie, 2005)

Non-linear decomposition method is used to explain, quantify and identify difference or gap between groups when the model is non-linear such as the logit and probit model (Fairlie, 2005; Powers et al., 2011; Powers & Pullum, 2006) hazard or duration models(Bauer *et al*., 2008; Powers *et al*., 2011). It has been used for several studies in medicine and public health. non-linear decomposition was used to explained factors influencing the North-South differentials in contraceptive use in Nigeria(Babalola

and Oyenubi, 2018). It was also used to identify factors contributing to gender discrepancy in total physical activity among Iranian women(Rahimi *et al*., 2017). In this study, the application of non-linear decomposition was further extended to determine the drivers of changes in sexual behaviour among youth in Sub Saharan Africa.

Transition from childhood to youth and from youth to later life represents the main transition stages where individuals experience behavioural, cognitive, physical and psychosocial change (Miller, 2016; Sharpe, 2003). Sexuality is one of the major changes that indicate the transition and it is categorized by a combination of eagerness, anxiety and behaviour toward the first sexual experience(Altemus *et al*., 2016; Olesen *et.al* 2012). Along with transformation comes with independent choice to explore new relationships and psychosexual direction that expose the youth to emotional and sexual vulnerability, especially in the school environment (Sarchiapone *et al*., 2018). This has a great impact on youth physical and psychological health, which affects their potential behaviour (Vasilenko, 2018). Henceforth, understanding patterns of changes in sexual behaviour and meeting the health needs remain priorities for health care systems for both developed and developing countries in order to prevent HIV/AIDS, sexually transmitted diseases, and unplanned pregnancy.

In this study, non-linear decomposition was employed to investigate changes in sexual behaviour among youth in four Sub Saharan Africa countries. Youth are categorized to be people age 15-24years according to United Nations. The indices for assessing sexual behaviour include age at first sex, premarital sex, multiple sexual partners, use of condoms and abstinence. When documenting the effect of interventions in reducing HIV, STIs and unplanned pregnancy, the case of sexual activity cannot be overlooked. Hence, these five sexual behaviour indicators mention were assessed, and two indicators with the highest magnitude of change were used for non-linear decomposition.

1.2 Problem statement

Young age is usually when youth try new roles, attitudes, and behaviours. Some youth choose to involve in risky behaviours such as early sexual debut and unprotected sexual intercourse. For some youths, the experience will be one of findings in their passing phase to adulthood. Sexual behaviour is largely a secluded action, subject to varying degrees of moral, social, religious, cultural, and legal customs and restrictions. According to the United Nations, there are 1.2 billion youth aged 15-24 globally, accounting for one out of every six people (17%) worldwide and this is predicted to increase to one out of every four people, which means there would be 1.3 billion youth by 2030(United Nation, 2019; United Nations, 2015). This global trend has particular pertinence to Africa, because Africa has the largest concentration of young people in the world, about 226 million youth aged 15-24 lived in Africa in 2015 representing nearly 20% of Africa's population, making up one fifth of the world's youth population(United Nations, 2019; United Nations, 2015).

Sub-Saharan Africa is a region known to bear a large burden of diseases in the world. HIV infection is not an exception and it is a major public health concern and cause of death in many parts of Africa(Kembo, 2013a). The prevalence of HIV/AIDS among the youth population in Sub-Saharan Africa differs within and between countries. Approximately 70% of all new HIV infections among young people are in Sub-Saharan Africa which has the fastest-growing youth population in the world, 20 countries in Sub-Saharan Africa accounted for an estimated 69% of the world's new HIV infections among young people, with an estimated 4.3% of young women and 1.5% of young men in the region living with HIV. In Eastern and Southern Africa, 11.9% of the population living with HIV are aged 15–24, with 710,000 South African youths, the largest youth population of any African country living with HIV/AIDS(USAID,2018).

In Sub-Saharan Africa, about 14 million unintended pregnancies occur every year, with more than 50% occurring among women aged 15-24 years. Hence, Sub Saharan Africa has the highest prevalence of youth pregnancy in the world(Odukogbe *et al.,* 2018).

Significant resource has been invested in health behaviour interventions carried out in places such as camps, health facilities, schools, and communities in other to reduce the number HIV/AIDS, STIs and unplanned pregnancy among youth in many African countries. One of the interventions is the campaigns that promote abstinence and use of condom as a way of preventing HIV and unplanned pregnancy, but while documenting the effect of the intervention, attention is taken away from the sexual activity and behaviour among the youth which causes a problem to identify the impact of the intervention on unplanned pregnancy, HIV and other sexual transmitted infections.

1.3 Justification for the study

Sexual behaviour is mostly study in related to HIV, STI and fertility and many studies have described the trends in key sexual behaviour indicators and factor influencing it but the factors influencing the trends are rarely assessed using decomposition technique. The quest to prevent HIV, STI, and unplanned pregnancy among youth in Sub-Saharan Africa makes it necessary to regularly assess if there are changes in sexual behaviour.

Changing sexual behaviour is an important strategy for preventing STIs and unplanned pregnancy(Sommer & Mmari, 2015; Shain *et.al* 2012). Behaviour that can reduce the risk of STI and unplanned pregnancy include delay sexual debut, limiting the number of sexual partners and use of condom. In this study, factors that influence the trend in sexual behaviour; include factors known to be important predictors of sexual behaviour among the youth was investigated and non-linear decomposition analysis was used to identify the potential factors that can be improved upon.

1.4 Research questions

1. What indicator of sexual behaviour has witnessed a significant change in Sub-Saharan Africa?
2. What are the predictors of sexual behaviour?
3. What are the drivers of changes in sexual behaviour in Sub-Saharan Africa youth?

1.5 Objective of the study

The broad objective of this study was to investigate factors influencing changes in sexual behaviour among youth in four Sub-Saharan African countries.

The specific objectives include:

1. To identify indicators of sexual behaviour that have witnessed the greatest magnitude of change
2. To identify the predictors of sexual behaviour.
3. To determine the drivers of changes in sexual behaviour among youth in four Sub-Saharan African countries.

CHAPTER TWO

LITERATURE REVIEW

This chapter discussed applications of Oaxaca-Blinder decomposition and its extension in medicine and public health, factor associated with sexual behaviour, overview of sexual behaviour related to HIV/AIDS and other sexually transmitted infection, and review of trend in sexual behaviour in Sub-Saharan Africa. Also, global literature on studies which have been undertaken on these factors was reviewed, and different theories were discussed in this study based on available literature on youth sexual behaviour in Sub-Saharan African countries.

2.1 Applications of Oaxaca-Blinder Decomposition and its extension in Medicine and Public Health

The Blinder-Oaxaca decomposition technique is a technique that decomposes differences between any two groups; it is widely used to identify and quantify the distinct contributions of group differences in quantifiable characteristics, such as education, experience, marital status, geographical differences, ethnic and gender to gaps in outcomes. The method cannot be used directly if the outcome is categorical and the coefficients are from a probit or logit model(Barrera-Osorio *et al*., 2011; Fairlie, 2005). The Oaxaca-Blinder method was firstly used in labour economics to decompose salaries gaps and to assessment the discrimination level (Barrera-Osorio *et al*., 2011).

For a linear regression, the standard Blinder-Oaxaca decomposition of the white/black gap (male/female, North//South, etc...) in the average value of the dependent variable, Y, can be expressed as:

$$\bar{Y}^W - \bar{Y}^B = \left[(\bar{X}^W - \bar{X}^B)\hat{\beta}^W\right] + \left[\bar{X}^B\left(\hat{\beta}^W - \hat{\beta}^B\right)\right] \quad \text{…..2.1}$$

Where X_j *is* a row vector of average values of the independent variables and $\beta^{\wedge j}$ is a vector of Coefficient estimates for race *j*. Following Fairlie (1999), the decomposition for a non-linear equation, such as $Y = F(X\,\beta^{\wedge})$, can be written as:

$$\bar{Y}^W - \bar{Y}^B = \left[\left(\sum_{i=1}^{N^W} \frac{F(X_i^W \hat{\beta}^W)}{N^W}\right) - \left(\sum_{i=1}^{N^B} \frac{F(X_i^B \hat{\beta}^W)}{N^B}\right)\right] + \left[\left(\sum_{i=1}^{N^B} \frac{F(X_i^B \hat{\beta}^W)}{N^B}\right) - \left(\sum_{i=1}^{N^P} \frac{F(X_i^B \hat{\beta}^B)}{N^B}\right)\right] \quad \ldots\ldots 2.2$$

Where *Nj* is the sample size for race *j*. This alternative expression for the decomposition is used because *Y* does not necessarily equal $F(X\hat{\beta})$. In both (2.1) and (2.2), the first term in brackets represents the part of the racial gap that is due to group differences in distributions of *X*, and the second term represents the part due to differences in the group processes determining levels of *Y*. The second term also captures the portion of the gap due to group differences in immeasurable or unobserved endowments (Fairlie, 2005; Banjo, Akinyemi, & Fotso, 2018). Also (Sinning *et al*., 2008) developed a general Blinder–Oaxaca decomposition that allows the differences in an outcome variable between two groups to be decomposed into two parts; a part that is explained by differences in observed characteristics and a part attributable to differences in the estimated coefficients also for non-linear regression models. Based on this general model, we show how it can be applied to different models with discrete and limited dependent variables.

The Oaxaca blinder decomposition technique has been used for a wide range of studies in various populations. It has been used to study gender differences in well-being in Chile (Graham and Chattopadhyay, 2013), it has been used to study financial strain and self-assessed health in Ireland(Mazeikaite *et al*., 2019), Gender differences in smoking behaviour(Bauer et al., 2007; Bauer and Mathias Sinning, 2006).It has been used widely in explaining wage differentials between immigrants and citizens, males and females, black and white workers. The logic behind this method is; it explained the difference in the outcome between two groups into two parts, a part that is explained by the difference in the level of the determinant, such as education attainment or income, and a part

that is explained by the difference in the effect of the determinants on the outcome variable. Oaxaca Blinder decomposition have been carried out using linear regression models with the function that such models fit exactly at the mean of the sample, the approach has also been used for ordered, binary, and count models(Fairlie, 2005; Sinning *et al*., 2008). The Blinder-Oaxaca decomposition and its extension method is gaining popularity in health research such as nutrition status, HIV/AIDS status, Immunization, child mortality. Report in medical literature suggest that Oaxaca Blinder decomposition is suitable for decomposition of child nutrition status (Nie *et al*., 2016, 2019).

Linear decomposition

In Europe, linear decomposition technique was used to decompose the difference in utilization of health facilities between depressed and non-depressed elders. A multivariate decomposition model was used to estimate the influence of prevalence and impact of covariates on utilization among depressed and non-depressed participants. A robust evidence was found that the gap in utilization between depressed and non-depressed elders can be accounted for by both prevalence and impact differences. The prevalence effect accounted for 57.7%, whereas differences in the impact of covariates between depressed and non-depressed persons explained 42.3% of differences in utilization rates(Ladin, 2012).

Sharaf and Rashad, (2015) decompose the rural-urban difference in child malnutrition into two components one that is explained by differences in the level of the determinants, and another component that is explained by difference in the effect of the determinant on the child nutrition status in their study of regional inequalities in child malnutrition in Egypt, Jordan, and Yemen. Linear decomposition was applied to decompose the change in health status from 1994 to 2006 for every sex and age group using data from the most recent rounds of the Demographic and Health Survey (DHS) for, Jordan, Yemen, and Egypt conducted in the years 2012, 2013, and 2014 respectively. The

investigator found the under-five stunting rates are 20 % in Egypt, 46.5 % in Yemen, and 7.7 % in Jordan. The rural-urban gap in child malnutrition was minor in the case of Egypt (2.3 %) and Jordan (1.5 %), while the regional gap was significant in the case of Yemen (17.7 %). Results of the Blinder-Oaxaca linear decomposition show that the co-variate effect is dominant in the case of Yemen while the coefficients effect dominates in the case of Jordan.

A number of studies have also been carried out using the linear decomposition technique and its extension in Sub-Sahara African countries. Banjo *et al*., (2017) applied linear decomposition to investigate change in women's status over time and its contribution to change in fertility behaviour in seven Sub-Saharan African countries using two data points with minimum of 10years interval of Demographic and Health Surveys. The investigators found changes in fertility were due to changes in women's status across the seven countries as well as changes in their background characteristics and the decomposition result showed that the explained change infertility was largely resulted from women's perception of gender role attitudes compared to women's involvement in household decision making. Owoeye applied linear decomposition to decomposed changes in malaria prevalence amongst under-five children between 2003 and 2013 in Nigeria using NDHS data into change in determinant contributed and change in the effect of the determinant contributed. The investigations found 18.7% point difference between 2003(31.8%) and 2013(13.1%) and also found change in determinant contributed to be 4.7% and change in the effect of determinant contributed to be 95.3% to the change in malaria prevalence(Owoeye *et al*., 2018).

Non-linear decomposition

In a retrospective cross-sectional study of racial/ethnic disparity in anti-obesity medication use among anti-obesity medication user in the United States, using the Medical Expenditure Panel Survey data of 200-2007 and 395,319,750 participants were extracted. Multivariable logistic regression to was

performed to observe racial/ethnic disparity in anti-obesity medication use controlling for predisposing, enabling, and need factors. The non-linear decomposition was then used to identify the contribution of each predisposing, enabling, and need factors and to estimate the residual unexplained disparity. The predisposing, enabling, and need characteristics (except marital status) was found not to successfully explain the racial/ethnic disparity in anti-obesity medication use. Thus, studies examining racial/ethnic differences in individuals was proposed in order to understand these disparities(Mehta *et al*., 2011).

Bishai *et al*.,(2016), also applied non-linear decomposition to factor contributing to maternal and child mortality reductions in 146 low and middle income countries between 1990 and 2010.The investigators decompose the model into two components which is component due to better health determinants and health coverage and a component due to changes in the impact of these health determinants and found 100% reduction in maternal mortality and 80% reductions in child mortality and also found 50% of those reductions is due to improvement in health sectors.

Non-linear decomposition was also used to identify factors contributing to gender disparity in total physical activity among Iranian adult using 2011 surveillance of risk factors of non-communicable disease. The investigators found the predicted gap to be 20%, and one-third of the gap was due to difference in the level of observational covariate among those covariates is work status (30% points), which contributed the most. And also found a substantial portion of the gap remained unexplained(Rahimi *et al.,* 2017). Linear and non-linear decompositions was also applied to identify how much the different socio-economic conditions of households contribute to the changes observed in stunting, underweight and the Composite Index of Anthropometric Failure (CIAF) using 6445,7634, and 5693 observations respectively from the 2004–2005 and 2011–2012 data from the Indian Human Development Survey (IHDS) in their study of changes in child nutrition in India and found incidence of stunting decreased by 7 percent points (45% to 36%) and underweight decreased

6 percentage points (33% to 28%) and also found maternal body mass index and education, account for much of the change in child nutrition and CIAF decreased by 8percent points (58% to 50%)in the non-linear decomposition(Nie *et al*., 2019).

Also, non-linear decomposition was applied to examine the relative weight of the factors that contribute to the North-South gap in contraceptive prevalence in Nigeria using 2013 NDHS. Non-linear decomposition was used to determine the contribution of demographic and socio-economic characteristics, conjugal relationship dynamic, intimate partner violence, ideational variable and Islamic culture to the North-South disparities in contraceptive use and found gap of 12.4% points in contraceptive prevalence between the North (5.2%) and South(17.6%) of Nigeria and also found ideational characteristics to be the largest contribution to the gap(Babalola and Oyenubi, 2018).

Non-linear Oaxaca Blinder decomposition was used to measure disparities in the rates of institutional births between rural and urban women in Ghana used 2003 and 2014 DHS data and the gap of 32.3% points in institutional births between rural and urban was discovered among women in Ghana(Amporfu and Grépin, 2019).

2.2 Factors associated with sexual behaviour

Sexual behaviours among young people are mainly influenced by environment, individual desires, and economic developments(Chigunta and Roach, 2019). Other factors include; age, level of education, socio economic, exposure to media.

Socio economic status

In a cross-sectional study of wealth status and risky sexual behaviour in Sub Saharan Africa. Awusabo-Asare and Annim, (2008), use wealth quintiles as a substitution for economic status and found socio-economic status as a factor associated with sexual behaviour and also found men in the

highest wealth quintile are more likely to have multiple sexual partners than another group in both Ghana and Kenya. Similarly, in a meta-analysis of risky sexual behaviour among youth in developing countries. The investigators assessed the relationship between education attainment, economic status, and sexual behaviour among young men using data from 26 countries, from both within and outside Sub Sahara Africa. young men socio-economic status was found to be directly related to the sexual behaviour. The relationship between socio-economic and sexual behaviour should be explored(Berhan and Berhan, 2015).

Exposure to Media

Exposure to media was defined as watching television, listening to radio, reading watching television or newspaper at least once in a week (Kwankye and Augustt, 2007; USAID, 2009). Several theories, hypotheses, and models have been examined to identify that exposure to media influence sexual attitude and behaviour. Although the conceptual mechanisms by which media can influence the sexual attitudes and behaviours of young people vary considerably(Chia, 2006). In a longitudinal survey conducted by O'Hara and Gerrard among the youth in the USA. The investigators explained the impact of exposure to sexual material on sexual debut and its consequent on sexual behaviour and examined early sexual debut as a factor that influence sexually transmitted infections and unplanned pregnancy, and found controlling character of youths along with their family reveals movie sexual exposure as predictive on the age of sexual debut. The study concludes exposure to pornography movie and materials promotes sexual risk taking by accelerating normal rise in sensation seeking and modified sexual behaviour during youth (O'Hara *et al*., 2012).

Literacy

Literacy is the ability to read and write, it allows a person to acquire basic skills, to develop the capacity for self-reflection and social awareness, and useful for life learning. Literacy is also tools in making informed reproductive decisions, maintaining good health, and raising a healthy child(UNESCO, 2015). In a study conducted by Marston in 2013, educated youth were more likely to provide valid answers related to timing of first sexual intercourse than those with little or no level of education and literacy was also found as a significant factor that associated with sexual behaviour and attitude(Marston *et al*., 2013).

Risky sexual behaviour

In a cross-sectional study of age at first sexual intercourse and multiple sexual partnerships among Nigeria women. Investigators found early sexual debut is associated with multiple sexual partnerships in sexual behaviour activity, which increase the risk of STI. The study could not be generalised since the study population is women only. Attitude of sexual behaviour should be investigated for both men and women.(Yaya and Bishwajit, 2018). Also, in a comparative study of predictors of increase in HIV/AIDS and risk sexual behaviours among Cameroonian and Gabonese Youth Aged 15-24 years. Hadish and Mao found age, educational level, place of residence, religion, occupation, wealth index, marital status, comprehensive knowledge and attitude of respondents to be associated with multiple partnerships(Hadish *et al*., 2017)

In a survey of factors that influence attitude and sexual behaviour among youth in Oshana region, Nambia, Sub Saharan Africa. Multiple sexual partnerships were discovered as factor that influence sexual behaviour and also found cultural aversion to the use of condom, cultural taboo on open discussion of sex and the subordinate socio-economic status of women as factor that influence transmission of HIV among youth. It is unclear how youth with and without prior knowledge were

evaluated from each other. The investigator need to separate attitude from knowledge, specifically knowledge on sexual behaviour be should be investigated (Lawoyin and Kanthula, 2010).

Behavioural and environment factors

In a cross-sectional study of social and behavioural factors associated with risky sexual behaviours among university students in nine Asian countries. Unprotected sex and multiple sexual partners were found as behavioural factors associated with risky sexual behaviour in all the nine Asian countries (Yi *et al*., 2018). Also, the influence of home environmental factors on adolescent sexual behaviour in Port Harcourt metropolis was assessed using Home Environmental Factor Inventory (HEFI) and Adolescents' Sexual Behaviour Inventory (ASBI) as instruments for data collection and the reliability of the instruments were determined using Cronbach alpha reliability technique. The investigators found parental control and marital stability as factors that influence adolescents' sexual behaviour. Families and their economic circumstance influence youth sexual behaviour(Nankinga *et al*., 2016).

Environmental factors was discovered as a significant factor that influences youth sexual behaviour in the study of environmental determinants of risky sexual behaviours among young people in Obollo-Afor Enugu Nigeria(Ekwueme and Omeje, 2013). In a study of psychological and behavioural factors associated with sexual risk behaviour among Slovak students. Data on behavioural factors such as inconsistent use of condom, drinking of alcohol, smoking, and early sexual initiation and psychological factors such as wellbeing, extroversion, self-esteem, and neuroticism was obtained, and behavioural factor was found to be associated with sexual risk behaviour than psychological factors(Kalina *et al*., 2009).

2.3 Overview of sexual behaviour related to HIV/AIDS and other sexually transmitted infection

Approximately 50% of new HIV infections worldwide occur among young people aged 15-24 years, changing sexual behaviour in this group will be crucial in tackling the pandemic(Marston and King, 2016). The prevalence of HIV/AIDS among youth in Sub-Saharan Africa is 2.2% in 2018 (USAID, 2019) and World Health Organization states that about 2.5 percent of HIV infections in Sub-Saharan Africa are caused by unprotected sex. In a USAID report, two rounds of DHS carried out in Ethiopia in 2000 and 2005 were used to describe change in key HIV/AIDS related knowledge and behaviour indicators. HIV was described in related sexual behaviour among the youth and discovered the proportion of young women and men who have never had sexual intercourse increased during the past five year. Also, proportions of young men who initiated sexual intercourse before age 15 and those who had premarital sexual intercourse decreased in the past five years. And it was concluded that changes show that intervention on HIV/AIDS is significantly improving the knowledge and minimizing risky behaviour among the youth(Suzuki *et al*., 2008).

In a cross-sectional study of changes in sexual behaviour leading to decline in the prevalence of HIV in Uganda, it was discovered that the participant reduces their number of sexual partners and increased their use of condom with non-marital and non-cohabiting partners lead to reduction in the prevalence of HIV and other sexual transmitted infections. And concluded that consistence with the findings will reduce HIV in Uganda and other Sub Saharan Africa(Kirby, 2008). Also in a study of changes in sexual behaviour and practice and HIV prevalence indicators among Zambia youth, it was discovered that changes in sexual behaviour as indicated by an improvement in use of condoms, abstinence and the reduction in multiple sexual partnerships is useful in the design of program to control the spread of

HIV/AIDS, particularly among youth in Zambia and other Sub Sahara Africa countries (Kembo, 2013b).

In 2017, Lawal and Olley conduct a study on sexual behaviours among long-distance truck drivers (LDTDs) in Haulage Company in Lagos, Nigeria. The result of the study showed that attitude towards use of condom, perceived vulnerability to HIV/AIDS, peer support to condom use and condom use self-efficacy significantly predicted sexual risk behaviours among the drivers. The result also showed that the more positive the attitudes of drivers towards condom use, the less they reported sexual risk behaviours. Thus high perception of vulnerability to HIV/AIDS was negatively related to higher sexual risk behaviours among the drivers (Lawal & Olley, 2017).

2.4 Review of trend in sexual behaviour in Sub-Saharan Africa

Several changes have been found to exist in the sexual behaviour of youths across the Sub-Saharan Africa regions, some of these changes promote positive reproductive health while others yield negative health outcomes. Sexual abstinence promotes positive reproductive health, primary abstinence among unmarried women ranges from 34% in Congo to 100% in Vietnam and Armenia. In sub-Saharan Africa, the levels of primary abstinence among never-married young women vary by region. The levels of primary abstinence in Western, Southern, Eastern and Central Africa in 2003/2004 were 62%, 57%, 63%, and 92% respectively among never-married young women and 62%, 42%, 37% and 60% among never-married young men. Levels of primary abstinence were much lower among young men than young women in these populations, except in Western Africa, where the level was the same for both sexes (USAID, 2008).

In a cross-sectional studied of changes in HIV-Related knowledge and sexual behaviours in the sub-Saharan Africa region. It was reported several changes in the indicators of sexual behaviour among youths in the region. However, there was minimal change in Median age at first sex for most

countries, the median age at first sexual intercourse among women and men age 20–24 years varied across countries and gender. For the most recent surveys, the median age at first sex ranged from 15.8 years in Niger to 21.5 years in Rwanda among women and from 16.6 years in Kenya to 22.0 years in Niger among men. Comparing recent surveys with the earlier round shows a mixed pattern of changes in median age at first sex. Among women, the greatest change occurred in Rwanda, where the median age at first sex rose by 1.5 years, and among men, the greatest change was in Niger, where the median age rose by1.7 years. Thus in both genders, there was a rise in the age at sexual debut in the population(USAID, 2019).

Multiple sexual partnerships among males and females was assessed by Kothari and found that more men than women had two or more sexual partners in the 12 months preceding the survey and have three or more lifetime partners. Percentage reporting multiple partners increased in countries such as Burkina Faso, Chad, Guinea, Mali, and Niger over the study period and decreased in Ethiopia, Kenya, Malawi, Mozambique, and Zimbabwe. The proportion of respondents who engaged in higher-risk sexual activities also varied widely in the recent round of surveys, it was substantially higher among men, from 9 percent in Ethiopia and Niger to 62 percent in Namibia and Cameroon and from less than 1percent in Niger to 55 percent in Namibia among women but comparing the survey rounds, there was no clear direction for changes in the proportion of women and men who reported higher-risk sex(Kothari, Wang, Head, & Abderrahim, 2012)

In a Meta-Analysis of Risky Sexual Behaviours among young males in Developing Countries, the major drivers of changes in youth sexual behaviours were age, the younger males aged between 15 and 19 years practised high risk sex more compare to older males 20 to 24year old. In most of the countries studied, males in urban residence had a higher tendency to practise higher-risk sex. Also, in all except a few countries, higher-risk sex was strongly associated with youths' level of education. The

pooled odds ratio also showed a statistically significant association between higher educational attainment and higher-risk (Berhan & Berhan, 2015).

The influence of ethnicity on youth sexual behaviour in Nigeria was conducted by Odimegwu and Somefun, (2017) and discovered that the median age at first sexual debut among the study population was 16 for females and 17 for males. 43% of male youths used condoms in their last sexual activity, compared to only 16% among females and a higher number of males (81%) had multiple sexual partners compared to females (35%). There was an elevated risk of first sex among Hausa/Fulani females aged 15–19 and elevated risk of first sex was higher among Yoruba males. Thus, study recommended that in order to promote protective sexual behaviour among youth in Nigeria, social, cultural, and gender-specific tactics should be put in place for the prevention of HIV and other STIs since all these factors drive changes in youth sexual behaviour.

2.5 Conceptual framework

The conceptual framework hypothesizes that sexual behaviour among youth is predicted by demographic factors, socio-economic factors, culture/environmental factors, and media factors. The demographic factors of sexual behaviour in the integrative conceptual framework include age, gender. The socio-economic factors include level of education and wealth index. The environmental factors in the framework are place of residence and religion, while the media factor include exposure to media (Uchudi et al., 2012; USAID, 2018).

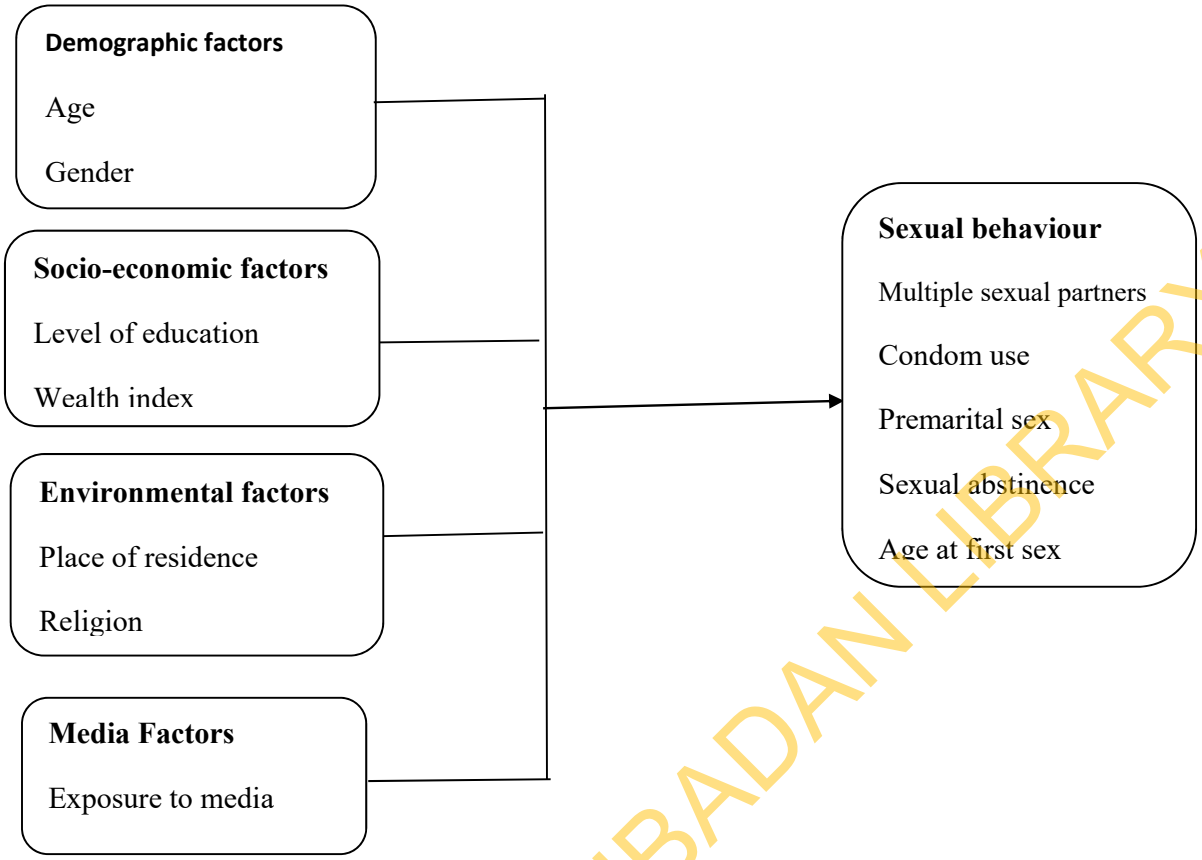

Figure 1: Conceptual Framework (Uchudi et al., 2012; USAID, 2018).

CHAPTER THREE

METHODOLOGY

This chapter shows details of the study design, study population, data source, and selection of study countries, study variables, data management, and statistical method for data analysis.

3.1 Study design

This study was cross-sectional study, it was a secondary analysis of repeated Nationally representative household sample survey for four countries in Sub-Saharan Africa and the selected country are Nigeria, Lesotho, Chad, and Uganda. See next page for description of country choice.

3.2 Study population

The population of young respondent male and female age 15-24years for each selected country.

3.3 Data source

The data used for this study is Demographic Health Survey (DHS). Participants in the DHS were selected through a multistage sampling process that involves first sampling clusters with probability proportional to size and then households within the selected cluster. Demographic and Health Survey (DHS) is a project funded by the United States Agency for International Development and implemented by ICF Macro. DHS data are cross-sectional, nationally representative household sample surveys. One country was selected from each sub-region in SSA such that:

i. The most recent round of DHS was not earlier than 2014

ii. There was a survey at least 10 years before the latest DHS

There have been some previous analyses of trends in sexual behaviour among adolescents and youths using surveys conducted in the 1990s and early 2000s. Therefore, the criteria above were deliberately set to avoid overlap and redundancy of information. Secondly, it provides opportunities to assess changes that have taken place in the round of surveys conducted from the 2000s till 2010s.These coincide with peak period of intensified efforts in behaviour change programming and several HIV prevention interventions

3.4 Selection of study countries

Sub-Sahara Africa has four sub-regions which are West Africa, East Africa, South Africa and Middle Africa. Using Stat compiler on DHS program website to identify countries in each sub-region and countries were selected based on a country with recent survey not earlier than 2014 and previous survey with an interval of 10years or more to recent survey in other to ascertain the change over time. Countries selected are Nigeria from West Africa, Lesotho from South Africa, Chad from Central Africa, and Kenya from East Africa. The selected country and year are presented in the table below;

Sub -Region	Country	Year of most recent survey	Year of selected preceding survey
West Africa	Nigeria	2018	2008
South Africa	Lesotho	2014	2004
East Africa	Uganda	2016	2006
Middle Africa	Chad	2014	2004

3.5 study variables

Outcome variable

The outcome variable for this study is sexual behaviour which was measured by age at first sex, premarital sex, abstinence, use of condom, and multiple sexual partners(Ajayi & Okeke, 2019; Kembo, 2013b; Kirby, 2008; USAID, 2009, 2012). The five sexual behaviour indicators were assessed, and two indicators with the highest magnitude of change were used for non-linear decomposition.

Explanatory variable

The choice of explanatory variable was based on literature on factors that influence youth sexual behaviour(Kembo, 2013b; Kirby, 2008; Lawoyin & Kanthula, 2010; Yaya & Bishwajit, 2018). These include age (15-24years), religion, level of education, place of residence, wealth index, and exposure to media.

The explanatory variable that are coded in the table below

SN	Variable	Code
1	Age	1. 15-19years 2. 20-24years
2	Religion	1. Christianity 2. Islam 3. Other
3	Level of education	0. None 1. Primary

		2. Secondary/higher
4	Place of residence	1. Urban 2. Rural
5	Exposure to media	0. No 1. Yes
6	Wealth index	0. Poorest 1. Poorer 2. Middle 3. Rich 4. Richest

For decomposition analysis the explanatory factors were categorized as; Socio-economic characteristics (level of education and wealth index), Culture/environment (place of residence and religion), Media exposure (exposure to media).

3.6 Data management

Data was extracted from the DHS, the data was cleaned, and the missing value was handled by using complete case (list wise deletion) and weighted using SPSS and then transferred to STATA in which descriptive, and non-linear decomposition were carried out. The dataset of recent and preceding survey for each of the country were merged together in STATA to form a single data for men and women separately before decomposition analysis was done.

Descriptive statistics was used to summarize sexual behaviour predictors. Percentage change between the two data point was estimated for both predictors and indicators. And non-linear decomposition was used to identify the gap between the two data points, where the gap was group into two components; contribution of changes due to characteristics and contribution of changes due to coefficients.

3.7 Statistical method for data analysis

3.7.1 Descriptive

the percentage change over time was calculated for the predictors and indicators separately, using the recent(R) and preceding(P) survey.

Formula

$$\%change = \frac{R-P}{P} \times 100 \quad \ldots.1$$

3.7.2 Non- linear decomposition

Non-linear decomposition run a logistic regression after iterating the data before decompose it. For decomposition to occur, logistic regression must be successfully run, and at least one of the independent variables must be significant.

- **Logistic regression**

Logistic regression is a special case of the generalized linear model, which is widely used in health research. Logistic regression is a type of regression model used when the outcome variable is categorical with one or more explanatory variable.

Assumptions of Logistic Regression

1. The response variable must be categorical.
2. The model should have little or no multicollinearity i.e. independent variable, should be independent from each other.
3. A large sample size is required.
4. There should be a relationship between the outcome variable and explanatory variable.

Logistic Regression Model

From a linear regression model below

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots + \beta_p X_p \quad \ldots 1$$

Where Y is the outcome variable, which is sexual behaviour, X's are the explanatory variables such as age and level of education, β's are the coefficient of the explanatory variables or the parameter to be estimated. The logit link function can be used to transform a linear regression to make it fit for probabilities because its output always takes values between zero and one. Therefore, Y can be expressed as logit (p) where is the probability of occurrence of an event. In this study, the event of interest is sexual behaviour.

The logit transformation is written as the log of odds:

$$odds = \frac{probability\ of\ \ change\ in\ sexual\ behaviour}{probability\ of\ no\ change\ in\ sexual\ behaviour}$$

$$odds = \frac{p}{1-p} \quad \ldots 2$$

Odds vary on a scale of (0, ∞), which makes the log to vary on a scale of (-∞, ∞). This implies that an addictive unit change in the explanatory variable bring a change in the odds by a constant multiplicative amount.

$$ln\left[\frac{p}{1-p}\right] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots + \beta_p X_p \quad \ldots 3$$

Taking the exponential of the model, we have;

$$e^{ln(\frac{p}{1-p})} = e^{\beta 0 + \beta 1 X1 + \beta 2 X2 + \beta 3 X3 + \ldots + \beta p Xp} \quad \ldots 4$$

If $z = \beta 0 + \beta 1 X1 + \beta 2 X2 + \beta 3 X3 + \ldots + \beta p Xp$, then equation 4 can be written as:

$$\left(\frac{p}{1-p}\right) = e^z \quad \ldots 5$$

The inverse of the logit function is the logistic function. Hence equation 5 is:

$$P = \left(\frac{e^z}{1+e^z}\right) \quad \ldots 6$$

Decomposition

For a linear decomposition, the standard Blinder-Oaxaca decomposition of the Recent/Previous gap in the average value of the dependent variable Y which is sexual behaviour can be expressed as:

$$\bar{Y}^R - \bar{Y}^P = \left[(\bar{X}^R - \bar{X}^P)\hat{\beta}^R\right] + \left[\bar{X}^R(\hat{\beta}^R - \hat{\beta}^P)\right] \quad \ldots 1$$

Where X is a row vector of average values of the independent variables such as age, level of education etc. and $\hat{\beta}$ is a vector of coefficient estimates of the model. Following Fairlie (1999), the decomposition for a non-linear equation, such as $Y = F(X\hat{\beta})$, can be written as:

$$\bar{Y}^R - \bar{Y}^P = \left[\left(\sum_{i=1}^{N^R} \frac{F\left(X_i^R \hat{\beta}^R\right)}{N^R}\right) - \left(\sum_{i=1}^{N^P} \frac{F\left(X_i^P \hat{\beta}^R\right)}{N^P}\right)\right] + \left[\left(\sum_{i=1}^{N^P} \frac{F\left(X_i^P \hat{\beta}^R\right)}{N^P}\right) - \left(\sum_{i=1}^{N^P} \frac{F\left(X_i^P \hat{\beta}^P\right)}{N^P}\right)\right] \quad \ldots 2$$

Gap Endowment effect Behavioural effect

Where $\bar{Y}^R - \bar{Y}^P$ is the predicted sexual behaviour for the recent and previous survey , X_i^R *and* X_i^P are the explanatory variables, $\hat{\beta}^R$ *and* $\hat{\beta}^P$ are the vectors of coefficient estimates, F is the cumulative distribution function from the logistic regression estimates, N^R *and* N^P are the sample size for youth in recent and previous surveys. The first component is the endowment effect which represents the portion of the change in sexual behaviour that is due to recent-previous difference in the distribution of explanatory variable included in the model while the second component is the behavioural effect, it is the portion of the change in sexual behaviour that is due to fundamental differences between the recent and preceding survey. This second component also represents the portion of the gap that is due to unobservable factors not included in the model.

To calculate the decomposition, define Y's as the average probability of the binary outcome of interest, which is change in sexual behaviour for factors, and F as the cumulative distribution function from the logistic distribution. Alternatively, for a probit model F would be defined as the cumulative distribution function from the standard normal distribution. An equally valid expression for the decomposition is:

$$\bar{Y}^R - \bar{Y}^P = \left[\left(\sum_{i=1}^{N^R} \frac{F\left(X_I^R \hat{\beta}^P\right)}{N^R}\right) - \left(\sum_{i=1}^{N^P} \frac{F\left(X_I^P \hat{\beta}^P\right)}{N^P}\right)\right] + \left[\left(\sum_{i=1}^{N^R} \frac{F\left(X_I^R \hat{\beta}^R\right)}{N^R}\right) - \left(\sum_{i=1}^{N^R} \frac{F\left(X_I^R \hat{\beta}^P\right)}{N^R}\right)\right] \quad \ldots 3$$

In this case, the previous coefficient estimates $\hat{\beta}^P$ are used as weights for the first term in the decomposition, and the recent distributions of the independent variables X_I^R are used as weights for the second term. This alternative method of calculating the decomposition often provides different estimates, which is the familiar index problem with the Blinder-Oaxaca decomposition technique. A third alternative, used in Neumark (1988) and Oaxaca and Ransom (1994), is to weight the first term

of the decomposition expression using coefficient estimates from a pooled sample of the two surveys. Ultimately, the choice across these alternative methods of calculating the first term of the decomposition is difficult and depends on the application, with many studies reporting results for more than one specification.

The first terms in (2) and (3) provide an estimate of the contribution of factor differences in the entire set of independent variables to the factor gap. Estimation of the total contribution is relatively simple as one only needs to calculate two sets of predicted probabilities and make the difference between the average values of the two. Identifying the contribution of group differences in specific variables to the sexual behaviour gap, however, is not as straightforward. To simplify, first assume that $N^P = N^R$ and that there exists a natural one-to-one matching of previous and recent observations. Using coefficient estimates from a logit regression for a pooled sample $\hat{\beta}^*$, the independent contribution of X_1 to the gap can then be expressed as:

$$\frac{1}{N^P}\sum_{i=1}^{N^P} F\left(\hat{\alpha}^* + X_{1i}^R\hat{\beta}_1^* + X_{2i}^R\hat{\beta}_2^*\right) - F\left(\hat{\alpha}^* + X_{1i}^P\hat{\beta}_1^* + X_{2i}^R\hat{\beta}_2^*\right) \quad \ldots 4$$

Similarly, the contribution X_2 of can be expressed as:

$$\frac{1}{N^P}\sum_{i=1}^{N^P} F\left(\hat{\alpha}^* + X_{1i}^P\hat{\beta}_1^* + X_{2i}^R\hat{\beta}_2^*\right) - F\left(\hat{\alpha}^* + X_{1i}^P\hat{\beta}_1^* + X_{2i}^P\hat{\beta}_2^*\right) \quad \ldots 5$$

The contribution of each variable to the gap is thus equal to the change in the average predicted probability from replacing the previous distribution with the recent distribution of that variable while holding the distributions of the other variable constant. A useful property of this technique is that the sum of the contributions from individual variables will be equal to the total contribution from all of the variables evaluated with the full sample.

Standard errors can also be calculated for these estimates. Following Fairlie (1999) an improved of Oaxaca and Ransom (1998), using the delta method to approximate standard errors. To simplify notation, rewrite (4) as:

$$\widehat{D}_1 = \frac{1}{N^P}\sum_{i=1}^{N^P} F\left(X_i^{RR}\hat{\beta}^*\right) - F\left(X_i^{PR}\hat{\beta}^*\right) \quad \ldots 6$$

The variance of $\widehat{D}_1$ can be approximated as:

$$Var\left(\widehat{D}_1\right) = \left[\frac{\delta\widehat{D}_1}{\delta\widehat{\beta}^*}\right]' var(\hat{\beta}^*)\left[\frac{\delta\widehat{D}_1}{\delta\widehat{\beta}^*}\right] \quad \ldots 7$$

Where $\frac{\delta\widehat{D}_1}{\delta\widehat{\beta}^*} = \frac{1}{N^P}\sum_{i=1}^{N^P} F\left(X_i^{RR}\hat{\beta}^*\right)X_i^{RR} - F\left(X_i^{PR}\hat{\beta}^*\right)X_i^{RR}$ and F is the logistics probability density function.

In practice, the sample sizes of the two groups are rarely the same and a one-to-one matching of observations from the two samples is needed to calculate (4), (5), and (7). In this, it is likely that the previous sample size is substantially smaller than the recent sample size. To address this problem, first use the pooled coefficient estimates to calculate predicted probabilities $\bar{Y}_i$ for each previous and recent observation in the sample. Next, draw a random subsample of recent equal in size to the full previous sample. Each observation in the recent subsample and full previous sample is then separately ranked by the predicted probabilities and matched by their respective rankings. This procedure matches recent who have characteristics, such as age and level of education, placing them at the bottom (top) of their distribution with previous.

The decomposition estimates obtained from this procedure depend on the randomly chosen subsample of recent. Preferably, the results from the decomposition should approximate those from matching the entire recent sample to the previous sample. A simple method of approximating this hypothetical decomposition is to draw a large number of random subsamples of recent, match each of these random

subsamples of recent to the previous sample, and calculate separate decomposition estimates for the selected countries in each sub-region of sub Saharan Africa.

Therefore, the specific indices estimated from decomposition analysis are predicted prevalence for both preceding and recent survey, gap between the two data point, endowment effect, behavioural effect, variables percentage explained, contribution of each explanatory factor to the gap, standard error, p-value, and confidence interval.

CHAPTER FOUR

RESULTS

The findings of this study are disseminated in sections as follows; the Changes in sexual behaviour indicators in four selected countries of sub-Saharan Africa examined in section 4.1, section 4.2 also examined the changes in demographic and socio-economic characteristics of male and female youth and Non-linear decomposition of changes in sexual behaviour for the four selected countries in Sub Saharan Africa examined in section 4.3.

4.1 Changes in sexual behaviour indicators in four selected countries of sub-Saharan Africa

Table 4.1 shows the percentage change in sexual behaviour indicators for the four selected countries in sub-Saharan Africa. The result shows a clear trend that age at first sex in Chad, Uganda, Lesotho and Nigeria is between 16 and 18years for males while it ranges from 15 to 17years among females. Apparently, there has been no appreciable change in the ages at first sex among young males and females in the four countries over about a decade covered by the study.

For abstinence, the percentage of youth who never had sexual intercourse increased significantly among young males in Chad (23.6%) and Nigeria (28.2%) while it declined in Lesotho by 31.2% from 36.8% in 2004 to 25.4% in 2014. Abstinence among females declined slightly in Chad (8.0%), Uganda (8.2%) and Lesotho (11.5%) while a minimal increase was observed in Nigeria (9.5%).

Table 4.1 further shows that the percentage of male youth who reported multiple sexual partners decreased by 80.8% and 23.9% in Chad and Nigeria respectively. In contrast, male youth in Uganda (10.5%) and Lesotho (23.4%) recorded increases in multiple sexual partners. Multiple sexual partnerships were much less prevalent among young females in the four countries. In addition, there was a decline in its prevalence among young girls in Chad (25.2%) while it increased by 61.4%, 3.7% and 9.2 in Uganda, Lesotho and Nigeria respectively.

There was a large variation in condom use among young men and women in the four countries. The percentage of young men who used condom at last sexual encounter increased in Uganda and Nigeria by 2.7% and 28.8% respectively but decreased in Chad by 12.2%. Among young women in Chad, Uganda, and Lesotho, condom use increased by 2.9%, 32.6% and 118.5% respectively. The level remained unchanged in Nigeria.

Table 4.1 also shows a significant increase in premarital sex among male youth in Chad (115.5%) whereas; decrease was recorded in Uganda (26.9%), Lesotho (72.8%) and Nigeria (46.1%). For young females, premarital sex increased in Chad only by 26.4% while it declined in Uganda, Lesotho and Nigeria by 44.4%, 67.4% and 30.4% respectively.

Table 4. 1: Changes in sexual behaviour indicators among youth in Chad, Uganda, Lesotho and Nigeria.

		MEN	WOMEN

Countries/indicators	Survey year	preceding survey(95% CI)	Recent survey(95%CI)	%Change	Preceding survey(95%CI)	Recent survey 95% CI	%Change
Age at first sex							
Chad	2014-2004	16(15, 18)	17(15, 18)	6	15(14, 17)	15(14, 17)	0
Uganda	2016-2006	16(14, 18)	16(14,18)	0	15(14,17)	16(15, 18)	7
Lesotho	2014-2004	16(15,18)	15(14,17)	-6	17(15,18)	17(16,18)	0
Nigeria	2018-2008	17(15,18)	18(16,19)	6	16(15,18)	16(15,18)	**0**
Abstinence							
Chad	2014-2004	48.9(45.2, 52.6)	60.5(58.3, 62.7)	23.6	36.0(34.1, 37.9)	33.1(32.0, 34.2)	-8.0
Uganda	2016-2006	39.5(37.8, 41.2)	37.8(35.7, 39.8)	-4.5	35.1(33.6, 36.7)	32.2(31.2, 33.2)	-8.2
Lesotho	2014-2004	36.8(34.2, 39.5)	25.4(22.7, 28.0)	-31.2	36.2(34.6, 37.9)	32.1(30.4, 33.8)	-11.5
Nigeria	2018-2008	58.6(57.2, 59.9)	75.0(73.7, 76.4)	28.2	38.5(37.9, 39.0)	42.1(41.3, 42.9)	9.5
multiple sexual partners							
Chad	2014-2004	16.3(13.5, 19.0)	3.1(2.4, 3.9)	-80.8	1.0(0.6, 1.4)	0.8(0.6, 1.0)	-25.2
Uganda	2016-2006	12.8(11.7, 14.0)	14.2(12.7, 15.6)	10.5	1.7(1.2, 2.1)	2.7(2.3, 3.0)	61.4
Lesotho	2014-2004	18.2(16.1, 20.4)	22.5(20.0, 25.0)	23.4	4.6(3.9, 5.3)	4.8(4.0, 5.6)	3.7
Nigeria	2018-2008	5.4(4.8, 6.1)	4.1(3.5, 4.7)	-23.9	1.2(1.1, 1.3	1.3(1.1, 1.5)	9.2
Use of condom							
Chad	2014-2004	26.6(21.7, 31.6)	23.4(20.0, 26.7)	-12.2	3.8(2.8, 4.8)	4.0(3.4, 4.5)	2.9
Uganda	2016-2006	41.0(38.5, 43.5)	42.1(39.2, 45.1)	2.7	12.7(11.2, 14.1)	16.8(15.8, 17.9)	32.6
Lesotho	2014-2004	-	75.3(72.1, 78.6)	-	25.0(22.9, 27.0)	54.6(52.1, 57.0)	118.5
Nigeria	2018-2008	36.8(34.5, 39.1)	47.3(44.0, 50.7)	28.8	10.3(9.8, 10.8)	10.3(9.6, 10.9)	-0.1
Premarital sex							
Chad	2014-2004	25.3(16.0, 34.6)	54.5(48.2, 60.8)	115.5	68.2(65.8, 70.5)	86.2(85.1, 87.2)	26.4
Uganda	2016-2006	10.1(7.7, 12.6)	7.4(4.9, 9.9)	-26.9	32.5(30.2, 34.7)	18.0(16.8, 19.2)	-44.4
Lesotho	2014-2004	8.3(3.3, 13.2)	2.3(0.9, 5.4)	-72.8	48.2(45.4, 51.0)	15.7(13.5, 17.9)	-67.4
Nigeria	2018-2008	50.0(45.3 , 54.7)	27.0(21.3, 32.6)	-46.1	41.0(40.1, 41.9)	28.5(27.4, 29.6)	-30.4

Based on findings summarized in Table 4.1, for each country and gender, two indicators with the highest percentage change were selected for decomposition. Selected indicators are shown in Table 4 2. Abstinence was used for Lesotho men and Nigeria women, use of condom was used for Lesotho women and Nigeria men, multiple sexual partners was use in Chad and Uganda for men and women while premarital sex was used for both men and women in all the selected four countries as the second indicator for decomposition analysis.

Table 4. 2: Countries and their selected indicators for decomposition analysis

Countries /indicator	Men	Women

Chad	Multiple sexual partners	Premarital sex	Multiple sexual partners	Premarital sex
Uganda	Multiple sexual partners	Premarital sex	Multiple sexual partners	Premarital sex
Lesotho	Abstinence	Premarital sex	Use of condom	Premarital sex
Nigeria	Use of condom	Premarital sex	Abstinence	Premarital sex

4.2 Changes in demographic and socio-economic characteristics of male and female youths

Table 4.3-4.6 below present the percentage change in demographic and socio-economic characteristics among youth over the time periods across the selected countries under study.

In Chad (Table 4.3), about a quarter of young men attained primary education in 2004 while close to four out of every ten attained higher educations. This pattern has remained virtually the same between 2004 and 2014. For women, about 60% had no formal education in 2004 while 22.0% had primary education. Secondary education has improved slightly by 21.2% among young females in Chad. The rural-urban distribution has changed over time such that about two-thirds of young men and women were domiciled in rural areas in the most recent survey. Similarly, there was a decline in the percentage of young men and women dwelling in households that belonged to the richest wealth quintile. The percentage of young men with access to media in Chad declined from 38.1% to 34.9% between 2004 and 2014. For young females, it declined from 21.0% to 19.0%.

In Uganda (Table 4.4), there was an increase in the percentage of young men (13.9%) and women (48.5%) higher education between 2006 and 2016. Rural-urban distribution remained almost the same (about 20% in urban and 80% in rural) except among young women, which showed a slight increase in the percentage of urban dwellers from 20.4 to 24.2% between 2006 and 2016. A substantial proportion of youth that were not exposed to media was also notice. The percentage of young women in the richest households decreased by 24.6%. Among young males, exposure to mass media ranged between 21.1 and 21.4% in 2006 and 2016 while it decreased slightly among young females from 14.0% to 13.2%.

In Lesotho (Table 4.5), there was a substantial reduction in the percentage of young males and females without education and primary education while there was an increase in secondary and higher education. There was an increase of 6.1% and 6.5% in proportion of youth in urban area compare to

decrease in rural area with percentage change of -7.9% and -8.6% for men and women respectively. A substantial increase was recorded among males (78.8%) and females (158.1%) in media exposure.

In Nigeria (Table 4.6), the percentage change for young males without education increased by 34.8% between 2008 and 2018 while it declined slightly among young women (7.9%). However, the percentage of those with higher education increased among men (21.1%) and women (26.3%). There was a slight increase in the proportion of urban residence compare to rural residence. Exposure to media decreased among young men (from 69.8% to 53.5%) while the level among women was the same in 2008 and 2018 (about 50.0 %.)

Table 4. 3: Changes in demographic and socio-economic characteristics among youths in Chad, Middle Africa

	MEN			WOMEN		
	2014	2014	%change	2004	20014	%change
Predictors /N	707	1952		2531	6884	
Age						
15-19	58.4	62.4	6.8	57.7	56.5	-2.0
20-24	41.6	37.6	-9.5	42.4	43.5	2.7
Level of education						
No education	34.2	35.1	2.5	60.0	55.8	-7.1
Primary	25.5	23.6	-7.4	22.0	22.9	4.0
Secondary	37.9	39.9	5.3	17.2	20.8	21.2
Higher	2.4	1.4	-40.4	0.8	0.5	-35.4
Place of residence						
Urban	59.8	34.4	-42.6	51.2	27.1	-47.1
Rural	40.2	65.7	63.4	48.8	72.9	49.3
Religion						
Christianity	31.5	34.1	8.2	29.7	33.8	14.1
Islam	65.6	62.6	-4.7	67.3	63.9	-5.1
Other	2.8	3.3	17.7	3.0	2.3	-23.4
Wealth index						
Poorest	11.6	12.8	10.0	14.4	17.2	19.1
Poorer	9.6	15.4	60.3	13.7	17.6	28.7
Middle	12.6	20.3	61.6	13.0	19.5	49.6
Richer	12.3	20.6	67.3	17.4	21.7	24.5
Richest	53.9	30.9	-42.7	41.5	24.1	-41.9
Exposure to media						
No	62.0	65.1	5.1	79.0	81.0	2.5
Yes	38.1	34.9	-8.3	21.0	19.0	-9.5

Table 4. 4: Changes in demographic and socio-economic characteristics among youths in Uganda, East Africa.

	MEN			WOMEN		
	2006	2016	%change	2006	2016	%change
Predictors/N	3193	2214		3610	8058	
Age						
15-19	58.0	57.4	-1.1	54.0	53.1	-1.6
20-24	42.0	42.6	1.5	46.0	46.9	1.9
Level of education						
No education	2.1	2.1	0.5	8.4	3.5	-58.1
Primary	61.0	59.1	-3.1	61.3	60.8	-0.8
Secondary	31.0	32.2	3.7	26.5	30.0	13.2
Higher	5.8	6.6	13.9	3.9	5.8	48.5
Place of residence						
Urban	19.8	20.7	4.4	20.4	24.2	18.7
Rural	80.2	79.3	-1.1	79.6	75.8	-4.8
Religion						
Christianity	76.0	75.4	-0.7	77.0	71.8	-6.8
Islam	13.5	13.4	-0.7	12.8	13.0	1.1
Other	10.5	11.4	8.7	10.1	15.3	50.7
Wealth index						
Poorest	18.9	19.6	3.6	18.6	20.9	12.1
Poorer	19.6	19.8	1.0	18.3	20.4	11.5
Middle	18.4	19.1	3.5	16.3	17.8	9.1
Richer	21.2	21.3	0.3	16.8	18.3	9.2
Richest	21.8	20.2	-7.3	30.0	22.6	-24.6
Exposure to media						
No	78.9	78.6	-0.3	86.0	86.8	0.9
Yes	21.1	21.4	1.2	14.0	13.2	-5.6

Table 4. 5: Changes in demographic and socio-economic characteristics among youths in Lesotho, Southern Africa.

	MEN			WOMEN		
	2004	2014	%change	2004	2014	%change
Predictors /N	1260	1057		3217	2842	
Age						
15-19	59.7	56.4	-5.5	54.7	54.3	-0.9
20-24	40.3	43.6	8.2	45.3	45.7	1.1
Level of education						
No education	10.1	2.3	-77.3	1.1	0.1	-86.8
Primary	59.8	44.9	-25.1	58.4	29.3	-49.9
Secondary	29.2	48.9	67.3	40.0	66.5	66.2
Higher	0.9	4.0	359.8	0.5	4.1	669.8
Place of residence						
Urban	22.3	28.4	27.5	25.0	31.5	25.7
Rural	77.7	71.6	-7.9	75.0	68.5	-8.6
Religion						
Christianity	-	66.0	-	-	60.2	-
Islam	-	1.4			2.0	-
Other	-	32.5	-		37.8	-
Wealth index						
Poorest	15.6	14.8	-5.6	17.6	18.4	5.0
Poorer	19.1	18.5	-3.1	20.1	18.1	-9.9
Middle	21.8	23.1	5.7	19.2	21.2	10.3
Richer	22.4	23.2	3.6	20.7	22.3	7.8
Richest	21.1	20.5	-2.7	22.4	20.0	-10.9
Exposure to media						
No	74.3	54.0	-27.3	84.6	60.2	-28.8
Yes	25.7	46.0	78.8	15.4	39.8	158.1

Table 4. 6: Changes in demographic and socio-economic characteristics among youths in Nigeria, Western Africa.

	MEN			WOMEN		
	2008	2018	%change	2008	2018	%change
Predictors /N	4970	4019		12357	15267	
Age						
15-19	51.8	61.6	18.8	51.9	55.2	6.3
20-24	48.2	38.4	-20.2	48.1	44.8	-6.8
Level of education						
No education	14.8	19.9	34.8	30.2	27.8	-7.9
Primary	14.5	9.2	-36.9	15.3	10.8	-29.5
Secondary	64.3	63.2	-1.7	49.3	54.8	11.1
Higher	6.4	7.7	21.1	5.2	6.6	26.3
Place of residence						
Urban	33.5	39.3	17.4	31.7	39.3	23.7
Rural	66.5	60.7	-8.8	68.3	60.7	-11.0
Religion						
Christianity	55.4	43.3	-21.8	54.3	45.7	-15.8
Islam	43.8	56.2	28.3	44.5	54.0	21.3
Other	0.8	0.5	-38.3	1.1	0.3	-77.0
Wealth index						
Poorest	17.5	21.1	20.1	20.4	18.5	-9.4
Poorer	18.7	20.0	7.0	19.9	21.2	6.7
Middle	21.6	22.1	2.2	20.3	22.1	8.6
Richer	24.4	21.2	-13.1	21.5	21.1	-1.9
Richest	17.7	15.6	-12.0	17.9	17.1	-4.3
Exposure to media						
No	30.2	46.5	54.2	49.2	49.8	1.1
Yes	69.8	53.5	-23.4	50.8	50.3	-1.0

4.3 Non-linear decomposition of changes in sexual behaviour for the four selected countries in sub-Saharan Africa

Table 4.7- 4.10 below present the non-linear decomposition of changes in sexual behaviour among youth in four selected countries in Sub Saharan Africa. The results show that the gap is mainly due to endowment inter-survey difference in observable characteristics of the study participant. The endowment effect is the portion of the change in sexual behaviour that is due to differences in the distribution of explanatory variables in the two surveys, while behavioural effect is the portion of the change in sexual behaviour that is due to differences in the effect of explanatory variables.

In Chad (Table 4.7), there was an absolute reduction of 13.1% in multiple sexual partners among male youth between 2004 and 2014. Culture/environmental characteristics made the largest contribution to this decline, explaining 111% of the endowment effect. For premarital sex, the same pattern was observed such that culture /environment explained 106% of the endowment effect. Multiple sexual partners was slightly decrease by 0.3% among the female youth. Culture/environmental characteristics also made the largest contribution to this decline, explaining 104% of the endowment effect. Different pattern was observed for premarital sex.

In Uganda (Table 4.8), there was a slight increase of 4.5% in multiple sexual partners among the male youth between 2006 and 2016. Socio-economic characteristics made the largest contribution to the rise, explaining -194% of the endowment effect. For premarital sex, there was a significant decrease of 9.8% between the two surveys, and culture/environmental characteristics is the most contributing factor to the decline, explaining 58% of the endowment effect. Similar trend was observed among the female youth but culture/environment characteristics was the most contributing factor for multiple sexual partners and socio-economic for premarital sex. Explaining 80% and 88% of the endowment effect.

In Lesotho (Table 4.9), there was a decrease of 11.4% and 6.1% in multiple sexual partners and premarital sex among the male youth between 2004 and 2014. Socio-economic characteristics made the largest contribution to the reduction for the two indices of sexual behaviour, explaining 54% and 90% of the endowment effect. Also, there was a substantial increase of 29.5% in multiple sexual partners and a decrease of 32.5% in premarital sex among the female youth between the two surveys. Socio-economic made the largest contribution to the effect. Explaining 57% and 194% of the endowment effect for multiple sexual partners and premarital sex respectively.

In Nigeria (Table 4.10), there was an increase of 10.5% in multiple sexual partners among male youth between 2008 and 2018. Media exposure made the largest contribution to this rise, explaining 444% of the endowment effect. For premarital sex, there was a substantial decrease of 23.1% between the surveys. Culture /environment made the largest contribution to the decline, explaining 135% of the endowment effect. Similar pattern was observed among the female youth.

Table 4. 7: Non-linear decomposition of sexual behaviour indicators among male and female youth in Chad, Middle Africa

	Male youth					
	Multiple sexual partners			**Premarital sex**		
Predicated prevalence:2004			0.163			0.253
Predicated prevalence:2014			0.032			0.545
2004-2014 gap			0.131			-0.292
Explained (endowments effect)			0.034			0.038
Unexplained (behavioural effect)			0.097			-0.331
Variables percentage explained			101%			99%
Explanatory factors	**contribution to the gap**	**std.error**	**%contributed**	**contribution to the gap**	**std. error**	**%contributed**
Socio-economic characteristics	-0.0037	0.0194	-11	0.0017	0.0614	4
Culture /environment	0.0376	0.0209	111	0.0406	0.0579	106
Media exposure	0.0004	0.0016	1	-0.0044	0.0065	-11
	Female youth					
	Multiple sexual partners			**Premarital sex**		
Predicated prevalence:2004			0.010			0.682
Predicated prevalence:2014			0.008			0.862
2004-2014 gap			0.003			-0.181
Explained (endowments effect)			0.001			-0.010
Unexplained (behavioural effect)			0.002			-0.170
Variables percentage explained			101%			102%
Explanatory factors	**contribution to the gap**	**std.error**	**%contributed**	**contribution to the gap**	**std. error**	**%contributed**
Socio-economic characteristics	-0.0001	0.0016	-6	-0.0179*	0.0075	175
Culture /environment	0.0014	0.0021	104	0.0092	0.0084	-90
Media exposure	0.0000	0.0002	3	-0.0018*	0.0006	18

Table 4. 8: Non-linear decomposition of sexual behaviour indicators among male and female youth in Uganda, East African.

	Male youth					
	Multiple sexual partners			**Premarital sex**		
Predicated prevalence:2006			0.098			0.167
Predicated prevalence:2016			0.143			0.068
2006-2016 gap			-0.045			0.098
Explained (endowments effect)			0.002			0.018
Unexplained (behavioural effect)			-0.047			0.080
Variables percentage explained			104%			99%
Explanatory factors	**contribution to the gap**	**std.error**	**%contributed**	**contribution to the gap**	**std.error**	**%contributed**
Socio-economic characteristics	-0.0048	0.0052	-194	0.0039	0.0076	22
Culture /environment	0.0041	0.0029	165	0.0103	0.0074	58
Media exposure	0.0033	0.0020	133	0.0034	0.0046	19
	Female youth					
	Multiple sexual partners			**Premarital sex**		
Predicated prevalence:2006			0.017			0.327
Predicated prevalence:2016			0.027			0.180
2006-2016 gap			-0.010			0.146
Explained (endowments effect)			0.001			0.018
Unexplained (behavioural effect)			-0.011			0.128
Variables percentage explained			101%			100%
Explanatory factors	**contribution to the gap**	**std.error**	**%contributed**	**contribution to the gap**	**std. error**	**%contributed**
Socio-economic characteristics	0.0001	0.0010	24	0.0162*	0.0048	88
Culture /environment	0.0005	0.0007	80	-0.0011	0.0026	-6
Media exposure	0.0000	0.0001	-4	0.0033*	0.0017	18

Table 4. 9: Non-linear decomposition of sexual behaviour indicators among male and female youths in Lesotho, Southern African.

	Male youth					
	Abstinence			**Premarital sex**		
Predicated prevalence:2004			0.368			0.083
Predicated prevalence:2014			0.254			0.022
2004-2014 gap			0.114			0.061
Explained(endowments effect)			0.013			-0.022
Unexplained(behavioural effect)			0.101			0.083
Variables percentage explained			100%			101%
Explanatory factors	**contribution to the gap**	**std.error**	**%contributed**	**contribution to the gap**	**std. error**	**%contributed**
Socio-economic characteristics	0.0074	0.0095	54	-0.0199	0.0343	90
Culture /environment	-0.0005	0.0020	-4	-0.0023	0.0094	11
Media exposure	0.0069*	0.0032	50	0(omitted)		
	Female youth					
	Use of condom			**Premarital sex**		
Predicated prevalence:2004			0.250			0.482
Predicated prevalence:2014			0.545			0.157
2004-2014 gap			-0.295			0.325
Explained(endowments effect)			-0.075			0.007
Unexplained (behavioural effect)			-0.22			0.318
Variables percentage explained			100%			100%
Explanatory factors	**contribution to the gap**	**std.error**	**%contributed**	**contribution to the gap**	**std. error**	**%contributed**
Socio-economic characteristics	-0.0427*	0.0074	57	0.0129	0.0093	194
Culture /environment	-0.0036*	0.0018	5	0.0019	0.0021	28
Media exposure	-0.0284*	0.0089	38	-0.0081	0.0101	-122

Table 4. 10: Non-linear decomposition of sexual behaviour indicators among male and female youths in Nigeria, East African.

	Male youth					
	Use of condom			**Premarital sex**		
Predicated prevalence:2008			0.368			0.501
Predicated prevalence:2018			0.473			0.270
2008-2018 gap			-0.105			0.231
Explained(endowments effect)			0.004			0.006
Unexplained (behavioural effect)			-0.109			0.226
Variables percentage explained			110%			129%
Explanatory factors	**contribution to the gap**	**std.error**	**%contributed**	**contribution to the gap**	**std.error**	**%contributed**
Socio-economic characteristics	-0.0114*	0.0019	-285	0.0059	0.0074	105
Culture /environment	-0.0020	0.0024	-49	0.0075	0.0034*	135
Media exposure	0.0177*	0.0061	444	-0.0062	0.0056	-112
	Female youth					
	Abstinence			**Premarital sex**		
Predicated prevalence:2008			0.340			0.547
Predicated prevalence:2018			0.421			0.286
2008-2018 gap			-0.081			0.261
Explained(endowments effect)			-0.016			0.007
Unexplained(behavioural effect)			-0.066			0.254
Variables percentage explained			99%			101%
Explanatory factors	**contribution to the gap**	**std.error**	**%contributed**	**contribution to the gap**	**std.error**	**%contributed**
Socio-economic characteristics	-0.0137*	0.0009	88	0.0106*	0.0023	143
Culture /environment	-0.0031*	0.0012	20	-0.0028*	0.0010	-38
Media exposure	0.0014	0.0012	-9	-0.0003	0.0003	-4

CHAPTER FIVE

DISCUSSION, CONCLUSION, LIMITATION AND RECOMMENDATION

5.1 Discussion

This study investigated changes in sexual behaviour among youth in four Sub Saharan Africa countries over one decade. Studies have showed that sexual behaviour can be measured by age at first sex, premarital sex, abstinence, use of condom, and multiple sexual partners(Ajayi & Okeke, 2019; Kembo, 2013b; Kirby, 2008; USAID, 2009, 2012) but for this study percentage changes between two surveys was estimated for the five indices of sexual behaviour, and two indices with highest magnitude of change were used for decomposition analysis.

Findings from percentage change in indicators showed that age at first sex among youth was between 15-18years. According to previous study, more than 28% of youth in most African countries are sexually active between the age of 15-19years. The median age range of 15.2-18.9 among the female and 16-19years among the male (USAID, 2019; Yaya & Bishwajit, 2018; Envuladu *et.al*, 2017). Early sexual exposure at this age can can be attributed to factors like peer pressure, increase in sexual desire, love and rape(Fagbamigbe *et.al,* 2017). The percentage of abstinence increased significantly among young males in Chad and Nigeria but declined in Uganda and Lesotho while decreased significantly among young females in Chad, Uganda and Lesotho but increased slightly in Nigeria. According Alhassan and Dodoo, abstaining from sex is one of the effective ways to prevent unwanted pregnancy and sexually transmitted infections among youth in sub-Saharan Africa. But contextual pressures make abstaining from sex a formidable task for urban poor youth in the sub-region. Nevertheless, some youth in these settings still manage to resist the pressure to initiate sex early, while others choose abstinence after an initial sexual debut (Alhassan & Dodoo, 2020). Similar trend was observed for premarital sex.

Previous study has identified a significant change in premarital sex between the year 1994 and 2004, has the proportion of youth who married as teenager as substantially reduce causes an increase in premarital sexual behaviour in more than 25 sub-Sahara African countries (Mensch *et al*., 2006).

There is also a considerable increase in the percentage of multiple sexual partners in Chad and Nigeria but decreased in Uganda and Lesotho while there were much less prevalent among young females in the four countries. Previous study has identified educational attainment and religion to be associated with multiple sexual partners. This is premised on the positive role that education makes in enlightening society on issues of behavioural change (Coleman & Testa, 2008). Other study has attributed the high percentage of multiple sexual partners among men to environmental mechanisms (Ekwueme & Omeje, 2013). On the contrary, religion can also be attributed to the low percentage of male's multiple sexual partners in Uganda and Lesotho, as Christianity (which does not support multiple partners) is predominant in these countries. From the feminine perspective, the prevalence of multiple sexual partners is very low. Our finding from this study can be attributed to the African perspective of loyalty and commitment of a woman to one partner, although some young women still have multiple sexual partners for financial or other personal reasons, but were not courageous to disclose it (Chama & Pranitha, 2008). In addition, Uchida et al argued that youths who are frequently exposed to pornographic and sexual-related news and information tend to be more likely to engage in multiple sexual partnerships (Kwankye & August, 2007; Uchudi et al., 2012).

There was a large variation in condom use among young males and females in the four countries. A significantly larger proportion of males are comfortable with using condom than their female counterparts, and are likely to be more consistent (Ndola *et al*., 2005). Furthermore, the use of condom for male is more known or accepted in the African region than condom for the female, as previous reports have said that nearly half of men reported consistent use of condoms compared to 31% of females (Newton *et al*., 2013; Walusaga *et al*., 2012).

Findings from changes in demographic and socio-economic characteristics among the youth showed that the impact on behaviour change is felt more among youth living in urban area compared to their counterparts in rural area which corroborates earlier studies by Kirby (2008). Lack of information and possibly, a wider exposure to risky behaviours such as alcohol use, smoking, etc., among rural dwellers are possibly responsible for this observation, and these needs to be taken into consideration in strategies for addressing sexual behaviours among youths in the urban settings (Sousa *et al*., 2018; O'Hara *et al*., 2012).

In this study, non-linear decomposition analysis was used to explain the changes in the prevalence of sexual behaviour for the four selected countries. This method allows explaining the proportion changes attributed to the determinants, and also the part attribute to change in the effect of the determinants between the two surveys (Mehta *et al*., 2011; Bishai *et al*., 2016; Babalola & Oyenubi, 2018)

The result of non-linear decomposition models further confirmed that explained change in sexual behaviour indicators were due to changes in the effect of the determinants this was similar to a study which reported that changes in sexual behaviour were due to changes in background characteristics (Chigunta & Roach, 2019); that sexual behaviour among the youth was influenced by environment and socio-economic processes, and O'Hara et al., (2012) discovered that exposure to media promote sexual risk-taking by accelerating normal rise in sensation seeking and modified sexual behaviour among the youth.

The analysis revealed that the key factors that determined the gap between the endowment effect and behaviour effect for the for selected countries are socio-economic and environment. This was in agreement with studies that there was any evidence of association between individual factors, environment, and sexual behaviour (Uchudi *et al*., 2012).

5.2 Conclusion

This study concludes that all the indicators of sexual behaviour have witness changes in the past decade but there are inequalities in changes of the five indicators and these inequalities were due to the inter-survey difference. Hence, youth sexual behaviour is changing in the four selected country in sub-Saharan Africa and the drivers of changes in sexual behaviour was explained by some of the changes in sexual indicators across the countries, and other explanatory factors also contribute substantially to changes in the sexual behaviour.

5.3 Limitations

The cross-sectional nature of the data used may influence some of the results found in this study since verbal reporting of the indices of sexual behaviour used are often susceptible to recall bias. Also, the use of secondary data in the study limits the choice of variables included in the analysis.

5.4 Recommendations

In view of the above findings, the following are recommended:

1. Promoting abstinence has been proven as an important strategy that has led to the delay in sexual activity among young people in sub-Saharan Africa, programmes that aimed at combating unplanned pregnancy, HIV and other STIs among the youth in sub-Saharan Africa should be deliberately seek to address the higher risk of HIV infection among young people age 15-24years.
2. Improvements in the prevalence of condom use among young men and women, which is essential in reducing STIs and unplanned pregnancy, should be revived, especially in cases where abstinence is not feasible.

3. The delay of sexual debut among young people has been well embraced in some sub-Saharan African countries. This should be continuously promoted and sustained by the government, and relevant organizations.

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APPENDIX

Stata do file for the analysis

CHANGE IN SEXUAL BEHAVIOUR*

missing data

```
recode exposure_m (9=.)

recode abstinence (9=.)

******for female*****

set maxvar 10000

rename *, lower

numlabel, add

keep if v013==1|v013==2

gen age=v013

gen edu=v106

gen place_res=v025

gen regional=v024

gen religion=v130

recode religion (1/2 =1) (3 =2) (4/6 =3)

recode religion (96/99=.)

recode religion (9=.)

label values religion  religion_ab

label define religion_ab 1 "christian" 2 "islam" 3 "other"

gen wealth_i=v190

gen exposure_m1=v159

recode exposure_m1(0 =0) (1/3 =1)(9=.)

label values exposure_m1 exposure_me

label define exposure_m1 0 "no" 1 "yes"
```

```
gen exposure_m2=v158

recode exposure_m2(0 =0) (1/3 =1)(9=.)

label values exposure_m2 exposure_me

label define exposure_m2 0 "no" 1 "yes"

gen exposure_m3=v157

recode exposure_m3(0 =0) (1/3 =1)(9=.)

label values exposure_m3 exposure_me

label define exposure_m3 0 "no" 1 "yes"

generate exposure_media=exposure_m1|exposure_m2|exposure_m3

******for male*****

set maxvar 10000

rename *, lower

numlabel, add

keep if mv013==1|mv013==2

gen age=mv013

gen edu=mv106

gen place_res=mv025

gen regional=mv024

gen religion=mv130

recode religion (1/2 =1) (3 =2) (4/6 =3)(96/99=.)

label values religion  religion_ab

label define religion_ab 1 "christian" 2 "islam" 3 "other"
```

```
gen wealth_i=mv190

gen exposure_m1=mv159

recode exposure_m1(0 =0) (1/3 =1)(9=.)

label values exposure_m1 exposure_me

label define exposure_m1 0 "no" 1 "yes"

gen exposure_m2=mv158

recode exposure_m2(0 =0) (1/3 =1)(9=.)

label values exposure_m2 exposure_me

label define exposure_m2 0 "no" 1 "yes"

gen exposure_m3=mv157

recode exposure_m3(0 =0) (1/3 =1)(9=.)

label values exposure_m3 exposure_me

label define exposure_m3 0 "no" 1 "yes"

generate exposure_media=exposure_m1|exposure_m2|exposure_m3

*******indicators******

*****women*****

gen ageatfirstsex=v525

recode ageatfirstsex (0=.)

recode ageatfirstsex (96/99=.)

tab ageatfirstsex

summarize ageatfirstsex, detail

gen abstinence_f=v536==0
```

```
tab abstinence_f

gen useofcondom=v761

recode useofcondom (9=.)

tab useofcondom

gen premaritalsex= v525-v511

recode premaritalsex (10/0=0 ) (-10/0=1)

tab premaritalsex

gen multiplesexualpartners= v766b

recode multiplesexualpartners (1=0) (2/15=1) (0=.)

label define multiplesexualpartners 0 "no" 1 "yes"

******men******

gen ageatfirstsex=mv525

recode ageatfirstsex (0=.)

recode ageatfirstsex (96/99=.)

summarize ageatfirstsex, detail

gen abstinence_f=mv536==0

tab abstinence_f

gen useofcondom=mv761

recode useofcondom (9=.)

tab useofcondom

gen premaritalsex= mv525-mv511

recode premaritalsex (10/0=0 ) (-10/0=1)
```

```
tab premaritalsex

gen multiplesexualpartners= mv766b

recode multiplesexualpartners (1=0) (2/15=1) (0=.)

label define multiplesexualpartners 0 "no" 1 "yes"

tab multiplesexualpartners

*******proportion******

summarize ageatfirstsex, detail

proportion abstinence_f

proportion useofcondom

proportion premaritalsex

proportion multiplesexualpartners


****fairlie****

**chad****

recode mv007 (2004=0 "2004") (2014/2015=1 "2014"), gen (survey)

recode v007 (2004=0 "2004") (2014/2015=1 "2014"), gen (survey)

***kenya***

recode mv007 (2003=0 "2003") (2014=1 "2014"), gen (survey)

recode v007 (2003=0 "2003") (2014=1 "2014"), gen (survey)

***lesotho***

recode mv007 (2004/2005=0 "2004") (2014=1 "2014"), gen (survey)

recode v007 (2004/2005=0 "2004") (2014=1 "2014"), gen (survey)
```

****nigeria*****

recode mv007 (2008=0 "2008") (2018=1 "2018"), gen (survey)

recode v007 (2008=0 "2008") (2018=1 "2018"), gen (survey)

*****uganda*******

recode mv007 (2006=0 "2006") (2016=1 "2016"), gen (survey)

recode v007(2006=0 "2006") (2016=1 "2016"), gen (survey)

fairlie*women for the combine data set********

tab survey, gen(survey)

tab v106, gen(education)

tab v025, gen (placeofresidence)

tab v190, gen(wealthindex)

gen religion=v130

recode religion (1/2 =1) (3 =2) (4/6 =3)

recode religion (7/8=.) (10=.)

recode religion (96/99=.)

recode religion (7/10=.)

label values religion religion_ab

label define religion_ab 1 "christian" 2 "islam" 3 "other"

tab religion, gen (religionn)

gen exposure_m1=v159

recode exposure_m1(0 =0) (1/9 =1)

```
label values exposure_m1 exposure_me

label define exposure_m1 0 "no" 1 "yes"

gen exposure_m2=v158

recode exposure_m2(0 =0) (1/9 =1)

label values exposure_m2 exposure_me

label define exposure_m2 0 "no" 1 "yes"

gen exposure_m3=v157

recode exposure_m3(0 =0) (1/9 =1)

label values exposure_m3 exposure_me

label define exposure_m3 0 "no" 1 "yes"

generate exposure_media=exposure_m1&exposure_m2&exposure_m3

tab exposure_media, gen (exposuretomedia)


***fairlie****men for the combine data set********

gen survey=v007

tab mv106, gen(education)

tab mv025, gen (placeofresidence)

tab mv190, gen(wealthindex)

gen religion=mv130

recode religion (1/2 =1) (3 =2) (4/6 =3)

recode religion (96/99=.)

recode religion (9=.)
```

label values religion religion_ab

label define religion_ab 1 "christian" 2 "islam" 3 "other"

tab religion, gen (religionn)

gen exposure_m1=mv159

recode exposure_m1(0 =0) (1/9 =1)

label values exposure_m1 exposure_me

label define exposure_m1 0 "no" 1 "yes"

gen exposure_m2=mv158

recode exposure_m2(0 =0) (1/9 =1)

label values exposure_m2 exposure_me

label define exposure_m2 0 "no" 1 "yes"

gen exposure_m3=mv157

recode exposure_m3(0 =0) (1/9 =1)

label values exposure_m3 exposure_me

label define exposure_m3 0 "no" 1 "yes"

generate exposure_media=exposure_m1|exposure_m2|exposure_m3

tab exposure_media, gen (exposuretomedia)

********Non-linear decomposition model*********

fairlie abstinence_f (socio-economic: education2 education3 education4 wealthindex2 wealthindex3 wealthindex4 wealthindex5) (environment: placeofresidence2 religionn2 religionn3) (exposuretomedia: exposuretomedia2), by (survey)

fairlie useofcondom (socio-economic: education2 education3 education4 wealthindex2 wealthindex3 wealthindex4 wealthindex5) (environment: placeofresidence2 religionn2 religionn3) (exposuretomedia: exposuretomedia2), by (survey)

fairlie premaritalsex (socio-economic: education2 education3 education4 wealthindex2 wealthindex3 wealthindex4 wealthindex5) (environment: placeofresidence2 religionn2 religionn3) (exposuretomedia: exposuretomedia2), by (survey)

fairlie multiplesexualpartners (socio-economic: education2 education3 education4 wealthindex2 wealthindex3 wealthindex4 wealthindex5) (environment: placeofresidence2 religionn2 religionn3) (exposuretomedia: exposuretomedia2), by (survey)