REVIEW PAPER

Environmental chemical risk factors of breast cancer in Nigeria II: Adolescent hormonal contraceptives use

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Abstract
Globocan's 2018 cancer statistics show increasing rates of breast cancer in Nigeria. There is *sufficient evidence* in humans that hormonal contraceptive is a breast cancer risk factor particularly among African American women who begin use before 20 years of age or before first pregnancy. Nigerian breast cancer patients have identical subtypes as African Americans i.e triple negative tumors, early age of onset, clinically aggressive, and poor prognosis.

Data from Nigeria show that 37.4% adolescent girls engage in high-risk sexual behaviour. For adolescent girls, dual use of condom and other hormonal contraceptives have been recommended to prevent pregnancy and acquisition of STI/HIV. Adolescents in Nigeria have uncensored access to all the contraceptive mix including hormonal contraceptives. There are also some ethical concerns.

There are extremely harmful socio-cultural and socio-economic determinants that promote early sexual debut, Teenage Pregnancy, and Child Marriage. There are also grave health related, social and economic consequences for mother and child, and the community. Both Teenage Pregnancy and Child Marriage undermine nearly every Millennium Development Goal. The notable reason given by some fathers for embracing Child Marriage was to protect daughters from what was perceived as "unwholesome" Western values that permit loss of virginity, *pre*-marital sex and high adolescent sexual networking, necessitating the use of contraceptives.

Hormonal contraceptive is a modifiable risk factor of breast cancer. Appropriate early *pre*-adolescent and adolescent parental care and nurturing *before* the crisis stage in godly principles is the *gold standard* for preventing adolescents' use of contraceptives. Adolescent pregnancy and Child Marriage are *not* safe options.

Keywords: Breast cancer: Hormonal contraceptives, Adolescents

Introduction
This is the 2nd paper in this group of serialized systematic review articles (case studies) on Environmental Chemical Risk Factors of Breast Cancer. Part 1 is a "Broad Overview" on the subject; Part III is on the metal "Lead"; and Part IV is on "Pesticides." The "Broad Overview" contains what informed the study on environmental chemical risk factors of breast cancer in Nigeria, the broad and specific objectives of the study, and the already identified contributors to breast cancer risk. Breast cancer is a hormone dependent malignancy. The relationship between endocrine disrupting chemicals (EDCs) and breast cancer was discussed. What constitutes the "environment" within the context of

"environmental chemical risk factors" of breast cancer was defined. The method of study, —viz, study identification and selection, biological evidence of carcinogenesis of the chemicals, and Data extraction and synthesis were described. The result of the search generated the list of notable environmental chemical risk factors of breast cancer highly relevant to Nigeria. The chemicals were listed in a Table and grouped as listed in Committee's Evidence Review by National Academy of Sciences. The serialized articles in this special themed edition were selected "case studies" on some of the chemicals on the list.

Definition – for clarification of the title of this case study on hormonal contraceptives
What is the environment?

Within the context of breast cancer etiology/risk factors, a broad definition of "environment" includes anything that is not genetic.[1,2] The environment includes:

- **Lifestyle and behavioral factors,** such as alcohol intake, tobacco, and physical activity.
- **Chemical** agents that people are exposed to through pesticides, industrial pollutants, consumer products, medications e.g *exogenous* hormones, and endocrine disrupting chemicals.
- **Physical** agents, such as radiation from medical and other environmental sources and other non-mechanical substances.
- **Social and cultural influences**, such as family, community, psychosocial/social, and societal factors that may influence breast cancer risk.

Breast cancer is a hormone dependent malignancy. In addition to *endogenous* sources of estrogens and progesterone, there are several other sources of natural and synthetic steroids (exogenous hormones). This discourse is on *exogenous* hormones. Hormonal contraceptives are *exogenous* sources of hormones – hence are classified as "environmental chemicals."

Statement of the Problem
There is *sufficient evidence* in humans that hormonal contraceptive is a breast cancer risk factor particularly among African American women who begin use before 20years of age or before first pregnancy.[3-6] The risk is greatest particularly among those who have used the contraceptive for more than 5years and initiated use at a young age before the age of 20. Black-White racial disparities in breast cancer subtypes have been identified and are etiologically distinct. Nigerian breast cancer patients have identical subtypes clinical and behavioral characteristics as African Americans i.e., triple negative tumors, early age of onset, clinically aggressive, more resistant to treatment and poor prognosis.[7-10]

Globocan's 2018 cancer statistics show increasing rates of breast cancer in Nigeria with 50.5 per 100,000 women in 2012 and a projected estimated 84.2 per 100,000 women by the year 2030. Nigeria is second only to Mauritius with regards to breast cancer incidence in Africa, 50.5 per 100,000 and 64.2 per 100,00 women per year respectively. A more worrisome aspect of this development is the fact that even though Nigeria was ranked second in terms of breast cancer incidence, its age-standardized mortality ratio was the highest in Africa (25.9 per 100,000) compared to 18.8 per 100,000 for Mauritius[11,12,13]

Adolescents are caught between tradition and changing cultures brought about by urbanization, globalized economies, and media-saturated environment.[14] Traditional beliefs that guide adolescents sexuality, such as the traditional norm of chastity *before* marriage are being challenged and eroded.[15,16] Data from Nigeria show that 37.4% of female aged 15-19 years engage in high-risk sexual behavior.[17]

Hormonal contraceptives do not protect against STI/HIV. Emphasis has been placed on the dual use of condoms and other contraceptives especially Long-Acting Reversible Contraceptive (LARC) methods (injectibles and intrauterine device (IUD), to prevent pregnancy and STI/HIV infections which pose a huge threat to adolescent girls.[15,16] Male condom is only moderately effective against pregnancy as commonly used, but dangerously ineffective against adolescent pregnancy due to other iatrogenic factors as used in Nigeria.[17,18]Therefore, the counsel given to adolescents to use double contraceptives—injectables and condom is *not* full proof against pregnancy nor STIs/HIV.

While sexual initiation and sexual activity vary widely by region, country, and gender, in all regions young people are reaching puberty earlier,[19-22] often engaging in sexual activity at a younger age, and marrying late. Consequently, they are sexually mature for longer before marriage than has historically been the case. Hence, an adolescent girl who is on hormonal contraceptive has a long exposure to breast cancer risk factor *before* her first pregnancy and therefore highly vulnerable to the development of breast cancer later in life. Furthermore, as Nigerian girls have increasingly realized the benefits of education, participate in the formal labor market, earn more and marry later, the age of formal marriage and child bearing has increased which translates to increase years of use of contraceptives.[22] Adolescent girls in Nigeria have unfettered access to all the mix of contraceptives as over-the-counter (non-prescription) pharmaceuticals.[23-25] Although breast cancer risk accumulates throughout a woman's life, research suggests that the time between menarche and first pregnancy may be particularly critical.[26]

There are also concerns on ethical issues in the introduction of underage girls to contraceptives. Under the Nigerian Constitution, a person under 18years is defined as a minor.[27] However, the Federal Ministry of Health 2014 Guidelines for Young Persons Access to Sexual and Reproductive Health Services in Nigeria states that adolescents aged 12-14 can access Sexual and Reproductive Health Services (SHR) preventive services such as contraceptive services without parental consent.[28]

Added to the problem is the practice of Child Marriage. Some fathers of child brides in a study in Nigeria[29] justified their reason for embracing child marriage because of anxiety over breakdown of long-held family and community values, such as, the honor to preserve the virginity of daughters till marriage, prevent prostitution, high sexual networking with use of contraceptives, unwanted teenage pregnancy, abortion, childlessness, and perceived "unwholesome" Western values that allow what is considered unhealthy permissive lifestyle of young girls in some cities in Nigeria. Hence the issues of contraceptives, adolescent/teenage pregnancy, and child marriage are intertwined.

Many factors known to increase the risk of breast cancer are not modifiable, such as increasing age, genetics, family history, early menarche, and late menopause. Since hormonal contraceptive is eminently one of the modifiable risk factors, there is need to explore ways of preventing adolescent girls from exposure to hormonal contraceptives. It is therefore imperative to assess the characteristics of hormonal contraceptive use by adolescent girls in Nigeria, as this may be critical to developing upstream interventions to reduce the use of hormonal contraceptives by adolescent girls.

Aim of study

The aim of this study was to identify implementable culturally sensitive intervention strategies that would prevent the use of hormonal contraceptives by adolescent girls in Nigeria

Objectives of this study were to

- describe the relationship between hormonal contraceptive and breast cancer risk
- identify the types and dynamics of contraceptive use among adolescent girls in Nigeria
- highlight adult perspectives as regards adolescents' *pre*-marital sex and contraceptive use

- describe the scope and determinants of early sexual debut and teenage pregnancy in Nigeria and the complications of teenage pregnancy
- describe the complications of Child Marriage and the benefits of ending child marriage
- recommend implementable culturally sensitive alternative strategies to mitigate adolescent use of hormonal contraception.

Method of study

A review of published studies and documents was conducted in Medline, Scopus, PubMed, Google Scholar, Global health, Science Direct, EMBASE, and African Journals Online for published studies and documents in English from 2000-2020 that reported studies on Breast Cancer and hormonal contraceptives. Some earlier dates of articles were chosen if found highly relevant to the study. Searches included "breast cancer;" "Mammary tumors" in combination with hormones and hormonal contraceptives. We also searched for "Contraception" "Contraceptives" in combination with methods, adolescents/teenage in Nigeria, types, sources, adult perspectives, ethical issues. We searched for articles on Teenage/Adolescent pregnancy, Child Marriage. We extracted articles that we perceived as highly relevant to Nigeria.

Outline of presentation

This article shall be presented in four Sections
Section 1: Breast cancer; Incidence, Contributors, Hormones as risk factor
Section 2: Adolescent Contraceptive use in Nigeria
Section 3: Intertwined Issues—Premarital Sex, Teenage Pregnancy, Child Marriage
Section 4: Discussion, Conclusion and Recommendations

Section 1

- Incidence of breast Cancer in Nigeria
- Contributors to breast cancer risk
- Racial disparities in breast cancer
- Relationship between breast cancer and hormones
- Diethylstilbestrol (DES): Lessons to be learnt
- Hormonal Contraceptives
- Hormonal Contraceptives as breast cancer risk factor

Section 2

Adolescents Contraceptive use in Nigeria

Section 3

Intertwined Issues

- Determinants of female early sexual debut and teenage pregnancy
- Complications of Teenage/Adolescent pregnancy
- Child marriage – Consequences; Benefits of ending Child Marriage

Section 4

Discussion, Conclusion and Recommendations.

Section 1: Breast cancer: Incidence, Contributors, Hormones as risk Factor

1.0 Incidence of Breast Cancer in Nigeria

Globocan's 2018 cancer statistics show increasing incidence rates in Nigeria with 50.5 per 100,000 women in 2012 and a projected estimated 84.2 per 100,000 women by the year 2030.[30,31] Breast cancer incidence rates are highest among Non-Hispanic White women, with non-Hispanic Black

women (of which category Nigerian women fall) having the next highest incidence. Despite having a lower incidence rate compared to non-Hispanic White women, non-Hispanic Black women have a lower cancer survival rate due to a combination of factors such as aggressive tumor biology, younger patients, late stage of diagnosis, lack of access to treatment, to name a few.[31,32] Though Nigeria is second only to Mauritius with regards to breast cancer incidence in Africa (50.5 per 100,000 and 64.2 per 100,000 woman per year respectively), her age-standardized mortality ratio was highest in Africa (25.9 per 100,000, compared to 18.8 per 100,000 for Mauritius).[30,31] It is instructive to note that Africa and indeed Nigeria suffers from data unavailability with few cancer or other disease registries, thus the alarming figures above may be an underestimation. There is need to urgently identify the relevant environmental chemical risk factors, which may be associated with the rising incidence of breast cancer in Nigerian women.

1.2 Contributors to breast cancer risk

Past studies have identified contributors to BC risk, including: (1) increased age, (2) family history of breast cancer, (3) certain rare genetic variants including BRCA1 and 2, (4) alcohol consumption, (5) a sedentary lifestyle, (6) benign breast disease, (7) high breast density, (8) radiation exposure, (9) a number of reproductive characteristics including early age at menarche, (10) hormonal influences, and (11) high body mass index for risk of postmenopausal breast cancer. These recognized risk factors have not been definitively examined in interaction with physical and chemical exposures, and most have not been examined by breast cancer subtypes.[32,33]

1.3 Racial disparities in breast cancer

Breast cancer is widely recognized as a highly heterogeneous disease, commonly characterized by the gene or hormone receptor expression pattern of the tumor. Black – White racial disparities in breast cancer subtype have been identified and are etiologically distinct.[33]African-Americans are 2 to 3 times more likely to develop estrogen receptor negative (ER-), estrogen and progesterone receptor negative (ER-/PR-), or triple negative tumors (ER-, PR- and human epidermal growth factor receptor, HER2 negative), subtypes of the disease. This statistically significant disparity has meaningful clinical implications, as hormone receptor negative (HR-) tumors are associated with larger and higher-grade carcinomas at the time of diagnosis and are not responsive to current endocrine-based treatments such as Tamoxifen and Herceptin. As a result, women diagnosed with HR- tumors have higher rates of five–year cancer–related mortality than women diagnosed with other types of breast cancer regardless of tumor stage at the time of diagnosis. It is noteworthy that Nigerian breast cancer patients have identical subtypes,[34] clinical and behavioral characteristics as African Americans i.e. triple negative tumors, early age of onset, clinically aggressive and poor prognosis. As a result, identifying factors that influence the development of HR- breast cancer may be critical to developing upstream interventions to reduce mortality disparities.

1.4 Relationship between breast cancer and hormones

Breast cancer is a hormone dependent malignancy. Many breast cancer risk factors affect life-time exposure of breast tissue to hormones (early menarche, late menopause, obesity, and hormone use). Hormones are thought to influences breast cancer risk by increasing cell proliferation thereby increasing the likelihood of DNA damage, as well as promoting cancer growth. Hormones act as morphogens: extemporaneous exposure to even low doses of hormonally active chemicals increases the susceptibility to various diseases including cancer.[35,36] Estrogens are considered to play a major role in promoting the proliferation of both the hormonal and neoplastic breast epithelium. Their role as breast carcinogens has long been suspected and recently confirmed by epidemiological studies. Three major mechanisms are postulated to be involved in their carcinogenic effects: stimulation of cellular proliferation through their receptor-mediated hormonal activity, direct genotoxic effects by

increasing mutation rates through a cytochrome P450-mediated metabolic activation, and induction of aneuploidy.[37]

The breast can be extremely vulnerable at times of growth and change such as puberty and pregnancy. Since breast Cancer is a hormone dependent malignancy, increased lifetime exposure to estrogen, other hormones and higher exposures to early life links many of the established risk factors for breast cancer and are a key factor in the disease development.[38] Timing of exposure can be more important than dose. Female breast tissues may be more susceptible to environmental influences because of change in the breast through puberty, menstruation, pregnancy and menopause. None of the established risk factors directly causes the disease.[39] Furthermore, the unborn baby (the fetus) can be extremely vulnerable to the development of various serious diseases later in life, which may not be manifest at birth. Such serious diseases include developmental, neurological, or cancerous, including breast cancer. Advances in treatment and early detection mean women live longer after diagnosis but good as they are, such advances are neither prevention nor cure. Environmental factors are more readily identified and modified than genetic factors and therefore present a tremendous opportunity to prevent breast cancer. Identifying breast carcinogens could lead to risk reduction, which translates to primary prevention

In addition to endogenous sources of estrogens and progesterone, there are several other sources of natural and synthetic steroids from pharmaceutical and personal care products. Table 1 shows some hormonal agents that have been classified as carcinogenic by IARC and National Toxicologic Program (NTP).[40]

Hormones in pharmaceuticals and personal care products

Table 1 Carcinogenicity classifications and sources of exposures for hormones in pharmaceuticals and personal care products[40]

Product	IARC	NTP	Source of exposure
Diethylstilbestrol	1	K	Formerly prescribed to pregnant women to sustain viable pregnancies
Hormone Replacement Therapy	1		Treatment of symptoms experienced in menopause
Conjugated equine estrogens	2A		
Medroxyprogesterone acetate			
Bioidentical hormones	1		
Oral contraceptives	1		Contraception
Infertility treatment drugs			Infertility treatment
Clomiphene citrate	1		
Gonadotropins			
Hormones in personal care products	1		Use of placental extracts in personal care products, especially products marketed to women of color

International Agency for Research on Cancer (IARC) classifications: 1 = Carcinogenic to humans, 2A = Probably carcinogenic to humans, 2B = Possibly carcinogenic to humans, 3 = Not classifiable as to its carcinogenicity to humans; U.S. National Toxicology Program (NTP) classifications: K = Known to be a human carcinogen, RA = Reasonably anticipated to be a human carcinogen. Source of exposure list contains most common exposure sources.

1.5 Diethylstilbestrol (DES): Lessons to be learnt

Diethylstilbestrol (DES), also known as stilbestrol or stilboestrol, is a nonsteroidal estrogen medication, which is rarely used.[41-44]DES was discovered in 1938 and introduced for medical use in 1939.[45] From about 1940 to 1971, the medication was given to pregnant women incorrectly to reduce

the risk of pregnancy complications and losses.[45] In 1971, DES was shown to cause clear-cell carcinoma, a rare vaginal tumor, in girls and women who had been exposed to this medication *in utero*.[42,45] These women have an increased risk (about 30% higher) of developing breast cancer compared to women who have not taken DES.[46] Some studies also suggest that women whose mothers took DES during pregnancy have a slightly higher risk of breast cancer.[47] The United States Food and Drug Administration subsequently withdrew approval of DES as a treatment for pregnant women.[42,45] Follow-up studies have indicated that DES also has the potential to cause a variety of significant adverse medical complications during the lifetimes of those exposed.[45,48]

The United States National Cancer Institute recommends[49] women born to mothers who took DES to undergo special medical exams on a regular basis to screen for complications such as breast cancer. Individuals who were exposed to DES during their mothers' pregnancies are commonly referred to as "DES daughters" and "DES sons".[45,50] Since the discovery of the toxic effects of DES, it has largely been discontinued and is now mostly no longer marketed.[45,51]

A lawsuit was filed in Boston Federal Court by 53 DES daughters who say their breast cancers were the result of DES being prescribed to their mothers while pregnant with them. Their cases survived a Daubert hearing. In 2013, the Fecho sisters who initiated the breast cancer/DES link litigation agreed to an undisclosed settlement amount on the second day of trial. The remaining litigants have received various settlements.[52]

1.6 Hormonal Contraceptives

Breast cancer is a hormone dependent malignancy. In addition to endogenous sources of estrogens and progesterone, there are several other sources of natural and synthetic steroids from pharmaceutical and personal care products. Hormonal contraception refers to birth control methods that act on the endocrine system. There are two main types of hormonal contraceptive formulations: *combined methods* which contain both an estrogen and a progestin, and *progestogen-only methods* which contain only progesterone or one of its synthetic analogues (progestins).[53] There are many forms of hormonal contraception such as birth control pill, vaginal ring, contraceptive skin patch, and hormone-releasing contraceptive coils. Hormonal contraception is primarily used for the prevention of pregnancy but is also prescribed for the treatment of polycystic ovary syndrome, menstrual disorders such as dysmenorrhea and menorrhagia (to help regulate menstrual cycles), and hirsutism.[54] Minor side effects are breakthrough bleeding and serious complications are deep vein thrombosis (DVT), cardiovascular disease in women with pre-existing conditions like smoking, diabetes, obesity, and family history of heart disease.[55] Depression is also a notable adverse effect particularly amongst adolescents.[55]

1.7 Hormonal Contraceptives as breast cancer risk factor

Numerous studies have demonstrated an increased risk of breast cancer in women using oral contraceptives. The risk for breast cancer is greatest among current and recent users of oral contraceptives, particularly those who have used them for more than 5 years and initiated use at a young age before the age of 20.[56-61] Women in this study took contraceptives for an average of 6 years, although the duration of use varied from 2 ½ to 12 years.[62] The effect was magnified when oral contraceptive use continued for more than 20 years. Researchers in the Black Women's Health Study, a large (over 53,000 women) prospective study of women across the U.S., report that use of oral contraceptives by African American women was associated with a higher risk of receptor negative (ER−, PR−) cancer than women who did not use the pill.[63] The risk for later diagnosis of ER−/PR− breast cancer increased as the duration of contraceptive use was prolonged among women who took the pill and were still using it within the past 5 years.[64]

Women with BRCA1 or BRCA2 mutations, as well as women with family histories of breast or ovarian cancer, have an increased susceptibility to the risk-inducing effects of oral contraceptive usage[59,65,66] Significant associations between use of oral contraceptives and development of the aggressive triple negative (ER−/PR−/Her-2R-) form of the disease was found in a primarily White cohort[67] as well as in a cohort of African American women.[63] Use of oral contraceptives for 10 or more years has also been associated with a diagnosis of comedo DCIS,[68] the most aggressive form of DCIS which is sometimes confused with early forms of invasive breast cancer.[69]

Post-menopausal women who used oral contraceptives for eight or more years, but who have discontinued use for at least a decade, show no significant increase in breast cancer rates.[70,71] Two studies have examined the relationship between use of injectable progestin-only contraceptives and breast cancer incidence. Both studies found increases in breast cancer risk that were significant, but rates decreased to normal within a few years after stopping use of the drugs[72,73]

Section 2: Adolescent Contraceptive use in Nigeria

2.0 Preamble, Definitions and Demographic profile

Various terms are used to categorize young people: "adolescents" refers to 10-19 years olds (divided into early [10-14 years] and late [15-19] adolescence); "youth" refers to 15-24 years old; and "young people" refers to 10–24-year-olds. In the world today, approximately half of the population is under 25, with 1·8 billion people aged between 10 and 24 years—90% of whom live in low-and middle-income countries (LMICs) and many experience poverty and unemployment.[74,75] While sexual initiation and sexual activity vary widely by region, country, and sex[76] in all regions young people are reaching puberty earlier, often engaging in sexual activity at a younger age, and marrying later,[77-79] consequently they are sexually mature for longer before marriage than has historically been the case. Adolescence is a time of physical and sexual maturation, independence, conceptual and functional identity, cognitive development, and sexual self-concept. All of these place new challenges on the young person as they transition from adolescence to adulthood and this can be further complicated by economic, cultural, and political environments. Adolescents are caught between tradition and changing cultures brought about by urbanization, globalized economies, and a media-saturated environment. Traditional beliefs that guide adolescents sexuality, such as the traditional norm of chastity before marriage, are being challenged and eroded.[80] The risks of neglecting Adolescent sexual and reproductive health (ASRH) are great; a painful or demanding transition to adulthood can result in a lifetime of ill effects. For girls, early pregnancy/motherhood can be physically risky and can compromise educational achievement and economic potential. Adolescent girls in particular, face increased risk of exposure to HIV and sexually transmitted infections (STIs), sexual coercion, exploitation, and violence. All of these have huge impacts on an individual's physical and mental health, as well as long-term implications for them, their families and their environment. The global challenges centre around pregnancy, contraception, abortion, and Child Marriage.

The World Health Organization (WHO) has provided valuable resource materials[81] which can be adapted to country level strategies for preventing teenage pregnancy and poor reproductive outcomes among adolescents in a developing country like Nigeria. These guidelines are primarily intended for programme managers, technical advisors and researchers from governments, non-governmental organizations (NGOs) development agencies and academia. They are also likely to be of interest to public health practitioners, professional associations and civil society groups.

2.1 Socio-demographic profile of adolescent girls in Nigeria

Nigeria has a large population of over 173 million people.[82]

Adolescents constitute 22.8 percent of the total female population. [12·4% Age group 10-14; 10·4% Age group 15-9][83] The fertility rate is 122/1,000; 11·6% are married by age 15; 17·3% are married by

age 18; 27·8 have no education; and the literacy rate of young people is 57·1% (females), but 71·6% (males).[82] Age at menarche is 13·1 ± 0·08 with a median of 12.[84] The median age of first sexual intercourses is 17·6 years for women and 21·1 years for men age 25-49. Women and men tend to initiate sexual activity before marriage. The median age at first marriage among women age 25-49 is 18·1 years; the median age of first marriage among men age 30-49 is 27·2 years.[85]

2.2 Methods of contraception

Methods of contraception include oral contraceptive pills, implants, injectables, patches, vaginal rings, Intra uterine devices, condoms, male and female sterilization, lactational amenorrhea methods, withdrawal and fertility awareness-based methods. These methods have different mechanisms of action and effectiveness in preventing unintended pregnancy. Effectiveness of methods is measured by the number of pregnancies per 100 women using the method per year. Methods are classified by their effectiveness as commonly used into: Very effective (0–0.9 pregnancies per 100 women); Effective (1-9 pregnancies per 100 women); Moderately effective (10-19 pregnancies per 100 women); Less effective (20 or more pregnancies per 100 women)[86-88] The mechanisms of action and effectiveness of contraceptive methods are listed in table 2.

Table 2. Mechanisms of action and effectiveness of contraceptive methods[89]

Method	**How it works**	**Effectiveness: pregnancies per 100 women per year with consistent and correct use**	**Effectiveness: pregnancies per 100 women per year as commonly used**
Combined oral contraceptives (COCs) or "the pill"	Prevents the release of eggs from the ovaries (ovulation)	0.3	7
Progestogen-only pills (POPs) or "the minipill"	Thickens cervical mucous to block sperm and egg from meeting and prevents ovulation	0.3	7
Implants	Thickens cervical mucous to blocks sperm and egg from meeting and prevents ovulation	0.1	0.1
Progestogen only injectables	Thickens cervical mucous to block sperm and egg from meeting and prevents ovulation	0.2	4
Monthly injectables or combined injectable contraceptives (CIC)	Prevents the release of eggs from the ovaries (ovulation)	0.05	3
Combined contraceptive patch and combined contraceptive vaginal ring (CVR)	Prevents the release of eggs from the ovaries (ovulation)	0.3 (for patch) 0.3 (for vaginal ring)	7 (for patch) 7 (for contraceptive vaginal ring)
Intrauterine device (IUD): copper containing	Copper component damages sperm and prevents it from meeting the egg	0.6	0.8
Intrauterine device (IUD) levonorgestrel	Thickens cervical mucous to block sperm and egg from meeting	0.5	0.7
Male condoms	Forms a barrier to prevent sperm and egg from meeting	2	13

Method	How it works	Effectiveness: pregnancies per 100 women per year with consistent and correct use	Effectiveness: pregnancies per 100 women per year as commonly used
Female condoms	Forms a barrier to prevent sperm and egg from meeting	5	21
Male sterilization (Vasectomy)	Keeps sperm out of ejaculated semen	0.1	0.15
Female sterilization (tubal ligation)	Eggs are blocked from meeting sperm	0.5	0.5
Lactational amenorrhea method (LAM)	Prevents the release of eggs from the ovaries (ovulation)	0.9 (in six months)	2 (in six months)
Standard Days Method or SDM	Prevents pregnancy by avoiding unprotected vaginal sex during most fertile days.	5	12
Basal Body Temperature (BBT) Method	Prevents pregnancy by avoiding unprotected vaginal sex during fertile days	Reliable effectiveness rates are not available	
TwoDay Method	Prevents pregnancy by avoiding unprotected vaginal sex during most fertile days,	4	14
Sympto-thermal Method	Prevents pregnancy by avoiding unprotected vaginal sex during most fertile	<1	2
Emergency contraception pills (ulipristal acetate 30 mg or levonorgestrel 1.5 mg)	Prevents or delays the release of eggs from the ovaries. Pills taken to prevent pregnancy up to 5 days after unprotected sex	< 1 for ulipristal acetate ECPs 1 for progestin-only ECPs 2 for combined estrogen and progestin ECPs	
Calendar method or rhythm method	The couple prevents pregnancy by avoiding unprotected vaginal sex during the 1st and last estimated fertile days, by abstaining or using a condom.	Reliable effectiveness rates are not available	15
Withdrawal (coitus interruptus)	Tries to keep sperm out of the woman's body, preventing fertilization	4	20

2.3 Condoms

The use of hormonal contraception is a modifiable risk factor in the prevention of breast cancer development. The spectrum of family planning/contraception methods, mechanisms of action and effectiveness of contraceptive methods are comprehensively characterized by the WHO.[89] Since the condom is the notable contraceptive device recommended as an alternative, it merits further detailed discussion for appropriate evidence-based counseling of the sexually active adolescent girl desperate to prevent pregnancy and STDs and HIV.

The male condom is a sheath of latex or animal membrane. The female condom is made of polyurethane.[90] Animal membrane offers no protection against sexually transmitted diseases including HIV. Researchers have now found out that HIV leaked in 10-25% of condoms tested. Experts argue that latex condoms have intrinsic holes called voids which made it possible for the virus to pass through. The smallest detectable hole on a condom is 1 micron. The HIV is $^{1}/_{10}$th – $1/_{3rd}$ size (0.1-0.3 micron) of that hole.[91] Thus condoms have a substantial failure rate for HIV transmission. The additional use of a spermicide (a sperm killing chemical) which also kills HIV, with the condom has also been advocated. Although nonoxynol-9, a spermicide, kills HIV, it is contraindicated because in some patients it may cause genital ulcers that could facilitate HIV transmission.[92-94]

The effectiveness of condoms, as of most forms of contraception, can be assessed two ways. Perfect use or method effectiveness rates only include people who use condoms properly and consistently. Actual use, or typical use effectiveness rates are of all condom users, including those who use condoms incorrectly or do not use condoms at every act of intercourse. Rates are generally presented for the first year of use.[95] Effectiveness of contraceptives is measured by the number of pregnancies per 100 women using the method per year. Methods are classified by their effectiveness as commonly used into: Very effective (0-0·9 pregnancies per 100 women); Effective (1-9 pregnancies per 100 women); Moderately effective (10-19 pregnancies per 100 women); Less effective (20 or more pregnancies per 100 women).[89] Male condom is only moderately effective as commonly used (13 pregnancies per 100 women per year as commonly used).[89] Female condoms are less effective (21 pregnancies per 100 women per year as commonly use).[89] The typical use pregnancy rate among condom users varies depending on the population being studied.[95] Condoms may be combined with other forms of contraception (such as spermicide) for greater protection.[96] Condoms are often recommended as an adjunct to more effective birth control methods (such as IUD) in situations where STD protection is also desired.[97] For adolescent girls who are desperate not to get pregnant and not to acquire STDs and HIV, dual usage of condoms and other contraceptives especially Long Acting Reversible Contraceptive (LARS) has been recommended.[98]

Causes of condom failure

Furthermore, condoms can slip off or tear during intercourse; spillage of semen due to slipping or leakage tends to occur during detumescence of the male genital organ. Incorrect use also leads to spillage of semen. Latex condoms have a limited shelf life (expiry date) as latex deteriorates particularly under hot tropical climate. Some HIV infected patients have *deliberately* punctured condoms with pins or needles so as to transmit the virus to unsuspecting sex consorts. Latex may also cause serious allergic reactions in men and women. Condoms may slip off the penis after ejaculation, break due to improper application or physical damage (such as tears caused when opening the package), or break or slip due to latex degradation (typically from usage past the expiration date, improper storage, or exposure to oils). The rate of breakage is between 0·4% and 2·3%, while the rate of slippage is between 0·6% and 1·3%.[99] even if no breakage or slippage is observed, 1-3% of women will test positive for semen residue after intercourse with a condom.[100] Another possible cause of condom failure is sabotage. One motive is to have a child against a partner's wishes or consent.[101] Some commercial sex workers from Nigeria reported clients sabotaging condoms in retaliation for being coerced into condom use.[102] Using a fine needle to make several pinholes at the tip of the condom is believed to significantly impact on their effectiveness. Cases of such condom sabotage have occurred.[103]

Side effects of condom use

The use of latex condoms by people with an allergy to latex can cause allergic symptoms, such as skin irritation.[104] In people with severe latex allergies, using a latex condom can potentially be life-

threatening.[105] Repeated use of latex condoms can also cause the development of a latex allergies in some people.[106] Irritation may also occur due to spermicides that may be present.[107] Estimates of latex sensitivity in the general population range from 0.8% to 8.2%[108] Owing to millions of unidentifiable products containing latex and many routes for exposure to latex, preventing contact with latex allergies and reducing the prevalence of latex allergy are more difficult than expected. Reported data suggest that the average prevalence of latex allergy worldwide remains 9.7%, 7.2%, and 4.3% among healthcare workers, susceptible patients, and general population, respectively.[109]

2.4 Contraception among adolescents in Nigeria

Statistics from Nigeria show that about 15·5% girls and 6·2% of boys aged 15 to 19 years had initiated sex by 15years,[110] and 60% of boys and girls by 18years.[111] Data from Nigeria show that large numbers of adolescents aged 15 to 19 years engaged in high risk sexual behavior: 43·6% of sexually active boys and 61·6% of sexually active girls had had sex without the use of condom with non-marital sex partner in the last 12 months of the survey.[112] Within the last 12months of the 2012 National HIV and AIDS Reproductive Health Survey (NARHS), 37·4% of females and 19·7% of males aged 15years – 19years had had sex.[113]

In a 2013 report by the United Nations Population Fund (UNFPA),[114] 29·1% of Nigerian women gave birth before the age of 18, while 97·1% of sexually active girls aged 15-19 admitted to not using any form of contraception. Similarly, in a recent situational analysis conducted by Federal Ministry of Health (FMOH) in collaboration with WHO and other partners, teenage pregnancy emerged as top priority issue in 16 out of 36 states. The Federal Government in collaboration with key partners such as the World health organization (WHO)[115] recently resolved to redouble efforts to tackle the menace of unsafe abortions and adolescent pregnancies. Teenage pregnancies particularly in secondary and tertiary institutions are on the rise, leading many of the affected to commit unsafe abortions—as abortion is illegal in Nigeria. Contraceptive use remains low in Nigeria. In 2013, only 16% of all women of reproductive age (15-49) were using only contraceptive method, and only 11% were using a modern method—levels that remain virtually unchanged since 2008.[116]

2.5 The perils of misinformation and lack of knowledge as regards modern contraceptives

The reproductive choices made by young women and men have an enormous impact on their health, schooling, employment prospects and overall transition to adulthood.[116,117] In particular, school and work opportunities significantly influence young women's and men's marriage timing, quality of parenthood and ability to contribute to their families and society.[116,118,119]Young women reproductive choices are especially important, as early child-bearing can impair their health and limit their prospects for productive participation in society. Yet, within the context of this slow changing sexual behavior is the increasing access of the girl child to education which consequently increases her age of marriage.[118] A rising age of marriage, in turn, creates a gap between adolescence and marriage in which young people are more likely to have intimate sexual relation,[120] the possibility of premarital pregnancy is increased, and some young women may seek abortion as an option to prevent exclusion from education or to prevent the birth of an unintended child.[111] Evidence abounds that, in general, sexually active unmarried adolescents are not seeking to become pregnant, and married adolescents do not wish to become pregnant at a young age or, if they have already had a child wish to delay a second pregnancy.[121]

2.6 Factors affecting the seemingly low uptake of modern contraceptive

Several factors generate the low uptake of contraceptives among adolescents in Nigeria. (i) Reports in the National HIV Strategy for Adolescents and Young People (AYP) 2016-2020[122] revealed that AYPs demonstrated low comprehensive knowledge as regards sexual and reproductive health issues.[123] A large proportion of Nigeria's young people have little or no knowledge of sexual and

reproductive health. A survey of adolescents in five cities in Nigeria found that friends or schoolmates provided information on reproductive health and contraception for 26·2% of the young women surveyed and 34·1% of the young men[124] and some of the information was incomplete or incorrect. (ii) There are so much myths, disinformation, and misinformation about sex and reproductive health of adolescent girls. Some of these have been passed on through generations. Evidence of this highly pernicious state of ignorance/knowledge gap was manifest in the study by Otoide et al.[123] Through focus-group discussions held with adolescents of diverse educational and socioeconomic backgrounds, the researchers asked what they knew about abortion and contraception. In particular, youths were asked about contraceptive availability, perceived advantages of method used, side effects and young people's reasons for using or not using contraceptives. The results showed that fear of future infertility was an overriding factor in adolescents' decisions to rely on induced abortion rather than contraception. A recurring theme was that woman who use contraceptives will find it difficult to conceive in future. They believe the effects of modern-contraceptives on fertility to be continuous and prolonged and may eventually lead to infertility in marriage, while they saw abortion as an immediate and harmless solution to an unplanned or unwanted pregnancy—and, therefore, one that would have a limited negative impact on future fertility. This appears to be the major reason why adolescents prefer to seek induced abortion rather than practice modern contraception. (iii) The participants were aware of a variety of modern contraceptive methods—the pills, the IUD, injectables, the male condom and emergency contraception (the product Postinor). However, they perceived that condom was more as a means of preventing STDs and HIV than as a way of preventing a pregnancy. They did not like the pill because "it makes people put on weight," "frequent periods" (spotting), and "frequent dosing" as inconvenient. IUD was associated with being "missing" and possibly requiring an operation for removal in addition to interfering with future fertility. Participants associated injectables with abscess, paralysis and infertility. They have seen these latter complications in children from use of unsterile needles for injections and sciatic nerve damage. Condoms were seen as not being reliable in preventing pregnancy because of its high failure rate.

Curiously, when asked to name effective methods of modern contraception, participants often mentioned various brands of analgesics such as APC (a brand of aspirin), paracetamol and indocid; antibiotics (tetracycline and ampicillin), and quinine (an anti-malarial). They also mentioned menstrogen (a combination of ethinyl estradiol and ethisterone), and "apiol and steel" (parsley oil marketed for correction of female menstrual irregularity). Sometimes they use ergometrin, and gynaecosid (a hormonal preparation). Some of them also claim they sometimes use 'safe period' and 'withdrawal,' but only a minority of the educated participants provided correct responses as regards what constitute 'safe period.' They also named physical materials or charms such as a waistband, a padlock or a ring as contraceptives. Equally disturbing is that these girls believed in spurious ineffective methods of contraception and even used breast cancer risk factor agents such as strong alcoholic beverages, hormonal products, and tobacco powder as abortifacients.

2.7 Sources of information as regards contraceptives

Knowledge of contraception was from friends/relatives[124-128] and the most common source of contraceptive products was patent medicine dealers.[123,127] The use of patent medicine stores was seen as discrete and confidential. The adolescent girls in the focus group study found it most absurd going to waste valuable time in a government FP facility because of contraceptives when they could just walk into a patent medicine store and get any product on request. Some girls claimed they received some lessons on sexual and reproductive health at school but the lessons came rather belatedly because they were already sexually active and, in some cases, have had a pregnancy and a child.[125]

2.8 Sources of access to contraceptives by adolescents in Nigeria

Adolescent girls in Nigeria have unfettered access to all the mix of contraceptives. Adolescents have at least five sources of access to contraceptives:[122-132] (i) Planned Parenthood Federation (PPF) youth outreach teams to schools in the cities and far-flung rural areas, (ii) PPF private family planning clinics, (iii) Public family planning facilities (iv) Pharmacy shops, (v) Patent medicine stores dealers.

At the Planned Parenthood Federation (PPF) youth outreach in schools located in cities and rural areas, the contraceptives are provided free of charge. At PPF private clinics the contraceptives are provided at a highly subsidized rate, and there are myriad options on offer. Public family planning facilities are ubiquitous in most health facilities in Nigeria but there are major barriers to adolescents patronizing them because of negative provider attitudes and bias against adolescents' sexual activity, long waiting time, lack of confidentiality and personalized services, limited options of contraceptives which are usually the low-cost provider-driven long lasting hormonal contraceptives. Although all contraceptives are available as over-the-counter (without prescription) drugs at pharmacy shops, they are usually too expensive for the adolescent school girl. The vast majority of adolescents found it absurd patronizing public family planning (FP) clinics. This gave way to the patronage of an alternative clandestine source of services—the patent medicine dealers—which the girls claim meet all their perceived sexual and reproductive health needs. In general, adolescents did *not* feel that accessing contraceptives was a major hindrance. The reality is that adolescents in Nigeria have unfettered access to contraceptives in Patent Medicine stores which are found at many street corners in Nigeria. It is just that the adolescents lack knowledge about contraceptives, and the mode of action of contraceptives. This makes them vulnerable to deception by patent medicine dealers, who are themselves untrained for the services they offer. The reality is that there is a formidable and dangerous subterranean engagement of adolescents in an undocumented source of provision of sexual and reproductive health (ASRH) services—the patent medicine dealers, who have held the adolescents captive to a pot-pourri of unorthodox products such as tobacco powder, strong alcoholic drinks and hormonal agents—which are themselves breast cancer risk agents, as contraceptives and abortifacients. The girls were also given some charms as contraceptives. As expected, this is a major contributory factor to the high rate of unwanted pregnancies. Pregnancies occur because of inconsistent use, misinformation about contraceptives, vulnerability to deception by patent medicine store dealers, and inherent failure rates of contraceptives.

2.9 Barriers to adolescent contraceptive uptake

In Nigeria, adult and adolescent women and men use the same family planning (FP) facilities. Healthcare workers often act as a barrier to care by failing to provide adolescents with supportive, nonjudgmental services. Factors that contribute to poor adolescents' patronage of such service facilities include: negative provider attitudes and bias against adolescent sexual activities, limited access to youth-friendly services with adequately sensitized health care workers. Various political, economic, and sociocultural factors restrict the delivery of information and services, embarrassment, overloaded clinics (multiplicity of clients), long waiting time, absence of personalized services and possibility of any opportunity of dialogue with the providers, concern about confidentiality (fear of identification and parents/teachers being informed), socio-cultural norms about sex and adolescent use of contraceptives, and where family planning services are offered, low-risk perception and actual or perceived cost of contraceptives.[122,124,128,133,134] Thus special efforts are needed to respond effectively to adolescent needs in public FP facilities.

Therefore, the vast majority of adolescents found it absurd patronizing such services. This gave way to the patronage of an alternative lucrative clandestine source of service—the patent medicine dealers—which the girls claim to meet all their perceived sexual and reproductive health needs.[123] In general, adolescents did *not* feel that accessing contraceptives was a major hindrance. This is contrary

to the reports from other published studies.[135,137] Adolescents in Nigeria generally felt that the services offered by patent medicine dealers were sufficient to meet their contraceptive needs.[123] Even for the adults in South-East Nigeria the most preferred source of contraceptive products is patent medicine dealers (51%).[137] Since these dealers are located on street corners, such a finding is not a surprise, as they provide confidential services. This may also explain adolescents' misinformation that the use of modern antibiotics and other medications are contraceptives, as these were likely recommended by and procured from patent medicine dealers. Previous studies have shown that patent medicine dealers often are not trained in the services they offer and have diverse educational backgrounds with a significant number of them not literate.[135-138]

2.10 Types and dynamics of contraceptive use among adolescents

Unplanned pregnancies among adolescents happen despite the best of contraceptive intentions, and the effectiveness of adolescent pregnancy prevention programs remains below desired levels.[139-141] Adolescents' success in avoiding pregnancy often depends on having access to contraceptive information, methods and services. Contraceptive continuation over sustained periods of time is not assured, and discontinuation occurs for reasons of failure, method features, such as side effects or convenience of use, or change in need. Some women stop using altogether or immediately switch to another method, whereas others experience a gap in pregnancy protection of a month or more. Discontinuation is a particularly important issue for adolescents and young women because they tend to have more limited access than older individuals to family planning, as well as more unpredictable infrequent and irregular sexual activity, and are probably less knowledgeable about how to use contraceptive methods effectively.[129] According to a study of six developing countries, women younger than 25 were more likely than others to stop using their contraceptive method after 24 months.[142]

Blanc et al,[143] using the Demographic and Health Surveys 1986-2006, conducted a study to provide an overview of country-level change in sexual activity, contraceptive use and contraceptive discontinuation among adolescent females from more than 40 developing countries. The objective of the study is to gain insights into the contraceptive use dynamics among adolescents and compare with adults. In almost every country, a greater proportion of 15-19-year-olds than of women aged 20-49 reported experiencing a contraceptive failure within a year of starting method.[143] On average, failure rates for adolescents were about 25% higher than those for older women. This difference is likely due to several factors, including that adolescent tend to use less effective methods than older women, use methods less effectively and are more fecund. Contraceptive practice among adolescent women appears to involve much experimentation and inconsistent use. Compared with adult contraceptive use, adolescent use is characterized by shorter periods of consistent use, more contraceptive failure and more stopping for other reasons. This pattern is not surprising: unmarried adolescents commonly report infrequent sex as a reason for not using contraceptives,[144] and many married adolescents stop use to get pregnant. In Nigeria, the most populous country in the Sahel—as well as in Africa as a whole—only 12% of adolescent females use contraceptives, although there were wide regional variations in prevalence. Overall, current use of contraceptives was higher among sexually active, unmarried adolescents than among married youths.[143]

Ezire et al[124] studied the patterns and trend in contraceptive use in South-South and North-Western zones of Nigeria: 2003-2011. Data for the study were obtained from four waves of the National and State Specific HIV and AIDS, Reproductive and Child Health Survey—NARHS/SARHS (2003, 2005, 2007, and 2011). Data were collected among men and women of reproductive age in the 36 states of Nigeria including Federal Capital Territory (FCT). For the analysis, the study was however limited to North West and South-South zones of Nigeria. Bivariate and multiple logistic regression was performed using SPSS version 20.

Table 3 shows the spread of use of the contraceptive mix by age groups. As regards adolescents 5·5% use modern methods and of this figure 4·4% use the condom.

Table 3. Contraceptive use by age categories[124]

	Age group (n=20,928) (%)				
	15-19	**20-24**	**25-29**	**30-39**	**40-49**
Modern methods	5.5	11.1	12.6	9.5	6.5
Daily pills	0.5	1.3	1.7	2.0	1.0
Emergency contraception	0.2	0.6	0.7	0.4	0.5
Condom	4.4	8.4	7.7	3.6	2.1
Injectables	0.3	0.7	2.5	2.8	2.0
Long lasting methods	0.0	0.0	0.1	0.5	0.8
Foaming tablets	0.0	0.0	0.0	0.0	0.0
Permanent methods	0.0	0.0	0.0	0.0	0.2
Non modern methods	1.0	2.6	2.9	3.2	1.9
All methods	6.5	13.7	15.5	12.7	8.4

Condom was the most common contraceptive used by adolescents from the analysis of the data derived from four waves of National and State Specific HIV and AIDS Reproductive and Child Health Survey—NHRHS/SARHS (2003,2011)[124] Some unmarried adolescents also stop use of contraceptives because they want to get pregnant for reasons already highlighted under *"Context, Drivers, and Mediators of Adolescent sexual activities in Nigeria"*

One of the girls in Oyedele's study[125] said *"Yes I am having sex without a condom because I have ended up trusting him, you know when you are dating someone for long it will not be a problem to have sex without condom."*

As regards the issue of discontinuation of contraceptive use, the authors of the current study have seen several cases of contact dermatitis on the penis from latex of condom and of course such patients simply discontinue the use of condom after treatment of the highly pruritic penile rash. Although not very common, there have been cases of death from suspected latex anaphylaxis while having sex but because of the circumstances during which such deaths occurred, such deaths have been attributed to retributive judgment from the 'gods' for engaging in illicit sex and the local name for such deaths is "magun." As evidenced from the focal group discussion study by Otoide et al,[123] the girls are aware of the unreliability of the condom as regards prevention of pregnancy although they may not know the contributory factors to this high failure rate. Furthermore, as already highlighted in the earlier discourse on Condom, some men in Nigeria deliberately perform a pinhole defect on the condom if coerced by the women to use a condom. This is usually done (without the knowledge of the partner) either to punish the partner with transmission of HIV or a pregnancy, particularly if she is suspected of having multiple sexual partners. Atimes an HIV positive partner because of bitterness that someone transmitted HIV to him, may be simply vengeful and decide to transmit it to someone else. This type of scenario was observed during the peak of the HIV/AIDS pandemic when condoms were deliberately punctured with a pin before use. Other notable reasons for ineffective condom use have already been documented earlier under the discourse on Condom. It is also important to note that hormonal contraceptives do not prevent transmission of STIs and HIV. Emphasis has also been placed on the dual usage of condoms and other contraceptives especially Long-Acting Reversible Contraceptive (LARC) methods (e.g injectables and IUD), in order to prevent STI/HIV infections which pose a huge threat to adolescent girls. Therefore, the counsel given to adolescents to use double contraceptives—injectables and condom is *not* full proof against pregnancy, STIs and HIV.

In conclusion, the findings from this study indicate a need for resources to be invested in research that can illuminate the patterns and influences behind the sexual and reproductive health transitions experienced by cohorts of young people in developing countries. Personal, social and institutional factors determine the initiation of pre-marital sex, timing and shifting of contraceptive practices at the adolescent stage, and have consequences for subsequent reproductive behaviours. Studying the changing dynamics of use, especially in relation to reproductive events, from the perspective of both genders requires investments in longitudinal data systems that have the potential to offer reliable explanations beyond what is possible from the macro-level. Modeling individual-level change will help to address issues regarding contraceptive adoption and continuation raised by this study and identify responsible contextual factors.

More importantly, it is critical to note that the focus group discussion study by Otoide et al[123] which engaged the adolescents themselves, revealed that there was a formidable and dangerous subterranean engagement of adolescents with an undocumented source of provision of sexual and reproductive health (SRH) services—the patent medicine dealers, which have held the adolescent's captive to a pot-pourri of unorthodox products as contraceptives and abortifacients. An urgent need at the current downward trajectory in SRH of adolescents is to research into the scope of the relevance of patent medicine providers in the delivery of alternative services of SRH to adolescents, as this may be a major focal point for reforms in the delivery of SRH services to adolescents.

2.11 Further observations on the relevance of hormonal contraceptives in the lives of adolescent girls in Nigeria

Since the role of hormonal contraceptives as a risk factor for breast cancer in the adolescent informed this study, it merits further attention. While sexual initiation and sexual activity vary widely by region, country, and gender, in all regions young people are reaching puberty earlier, often engaging in sexual activity at a younger age, and marrying later, consequently they are sexually mature for longer before marriage than has historically been the case. Hence, an adolescent girl who is on hormonal contraceptive has a long exposure to breast cancer risk factor, *before* her first pregnancy and therefore highly vulnerable to the development of breast cancer later in life.

The federal government of Nigeria, through the Federal Ministry of Health (FMOH), is unswerving in its efforts to ensure that Nigeria attains the Millennium Development Goals.[114] In line with this, the Federal Ministry of Health distributed free contraceptives to states and to family planning and child spacing programmes in April 2011.[114] Injectables remain the most popular contraceptive method, used by currently married women.[114] Private sector facilities continue to be the chief providers of contraceptive methods in Nigeria; 60 percent of users of modern contraceptive methods obtain them from the private sector.[114] Compliance with appointments and use remains a major challenge with the use of short term methods of FP.[145,146] It is with this recognition that long lasting methods are currently being promoted.

Injectable hormonal contraceptive is the most common contraceptives given to adolescent girls in FP facilities in Nigeria because (a) it is either dispensed free of charge or at a heavily subsidized cost by the Planned Parenthood Federation of Nigeria;[127] (b) it is long lasting, it is due to provider preference, it is the only type available because of multiplicity of clients;[127,131,147] (c) it is the most practicable for Planned Parenthood (PP) which dispatches youth outreach teams to schools in the cities and far-flung rural areas, offering free contraceptives to those who want them.[130] Most teenagers (who patronize PP private FP facilities) opt for Sayana Press, a lower-dose version of Depo-Provera, another injectable contraceptive, developed by Pfizer and approved for use in 2011 by the Medicines and Healthcare products Regulatory Agency (MHRA), the UK's medicines regulator, that prevents

ovulation for three months. The smaller needle makes the injectable option "less painful." At the Planned Parenthood Federation of Nigeria Clinic, Sayana Press, costs N500 ($1·38) a shot.[130]

Caldwell et al[131] strongly recommends the recognition of the central importance of hormonal methods, especially injectables. Caldwell et al also recommend that in view of the unfriendly attitude of providers at FP clinics in Nigeria "there is much to be said for assisting the market to provide services in its unobtrusive and anonymous ways." Literally all drugs, including hormonal contraceptives are available over-the-counter (without prescription) in Nigeria, and this was confirmed by the adolescents who claimed that they purchased hormonal contraceptives products they used as abortifacients from patent medicine stores in Nigeria. Even hormonal fertility pills are available over-the-counter as already highlighted earlier under the relevant discourse.[148] Hormonal contraceptives as a breast cancer risk factor is a modifiable intervention. It is critical that, in the process of avoiding teenage pregnancy, healthcare providers do not expose the girls to the risk of breast cancer in adulthood. Hormonal contraceptives should therefore be discontinued in the contraceptive mix for teenagers as a precautionary measure while further research on the product continues.

2.12 Adults perspectives as regards adolescents pre-marital sex and contraceptive use

Although there is a high level of sexual activity among unmarried adolescents, there is a great deal of denial among the older population.[131] Adolescents cause surprise if they go to family planning clinics, and are usually turned away.[131] This is so because adolescent pre-marital sex is a taboo in Nigeria and a major departure from the religion, tradition, culture and norm of the people of Nigeria who still expect a lady to abstain from sex and remain a virgin until her wedding day. In some way, the discourse on adolescents' pre-marital sexual activity and contraceptive use is still a radical idea in Nigeria. Even though the average age of first sexual intercourse is around 15. According to the World Bank, in many communities talking about sex before marriage is taboo, while contraception is believed to encourage promiscuity.[130] Nigerians are very religious people[130] and the two main religions—Christianity and Islam preach sex abstinence before marriage. A range of people have an influence on adolescents' access to information and services, including peers, parents, family members, teachers, and healthcare workers. Some argue that the single most important barrier to care is provider attitude.[133] Many healthcare workers deter adolescents from using services because of their lack of confidentiality, judgmental attitudes, disrespect, or not taking their patients' needs seriously. Anne Austin, an analyst at John Snow, a public health research organization based in Boston in the US, who has researched contraception use in Nigeria. Says *"Despite policies and programmes that have specifically targeted adolescents, very few have reached the ground at scale. Even if contraceptives are available, affordable and acceptable, until communities accept that adolescents may be engaging in sexual behavior, and support them accessing contraceptives, there will always be barriers to use."*[130] Indeed Caldwell and Caldwell[131] recommend that because "Men and adolescents cause surprise if they go to family planning clinics, and the latter [girls] are usually turned away, in these circumstances there is probably much to be said for assisting the market to provide services in its unobtrusive and anonymous way."[132]

Nurses and teachers usually have constant contact with teenagers (both in the hospital and at school) and also have important roles to play in the prevention of unplanned teenage pregnancy. Oluwaseyi Akpor et al[149] explored professional nurses and secondary school teachers' own perspectives on teenage pregnancy within two selected communities in Nigeria states which through previous studies have been identified as regions with highest rate of teenage pregnancy in Nigeria.[114,150] The majority of the participants [nurses and school teachers] expressed that although teenage pregnancy is a common occurrence in their communities, it is not acceptable. More than half of the participants did not accept nor condone the usage of contraceptives by teenagers. The study identified a number of

factors that may influence the rate of teenage pregnancy in the communities. The researchers and respondents [nurses and teachers] concluded that strategies to reduce teenage pregnancy should focus on building social capital for teenagers in communities and offering programmes that empower girls in the area of sexuality.[149] Furthermore, 82·5% of the respondents believe dating must only commence after the age of 20years and 92·5% believe dating must not involve sexual intercourse and the remaining believe dating can commence at 18years. 93·75% believe pregnancy among teenaged is absolutely unacceptable; 72·5% believe no family in a community will accept and support an unmarried pregnant girl, and that it depends on the religious background of the parents because *"in its real sense, it is uncultural, biblically it is wrong, and morally it is bad." "There should be no such thing among teenagers."*[149] As regards contraceptive usage among teenagers to prevent pregnancy, more than half of the respondents did not accept the usage of contraceptives by teenagers. A professional nurse said *"It must not even exist. Teenagers should not even know where contraceptives are sold. They should wait for the right age, it is not a thing for teenagers, and they are for grownups."*[149] Paradoxically, in some cultures, in Nigeria teenage pregnancy is perceived as a normal occurrence, a God-given gift as well as evidence of fertility[125,130,151,152]

2.13 Some ethical issues; Informed Choice

A large number of adolescents initiate sex early with the median age of sexual debut being 15.[153] Informed choice is an important principle in the delivery of family planning services.[154-157] It is obtained through a dialogue that respects the individuality of each prospective client and allows ample opportunity for the prospective user to ask questions, which the provider must answer fully. Every provider will need to clearly explain how the contraceptive works, and how soon pregnancy can occur after cessation of the use of the contraceptive. As an aspect of informed choice, it is required that all family planning providers inform users about potential side effects of a method and what they should do if they encounter such side effects. Contraceptive users should also be informed of other methods available to them. This information assists the user in deciding on sexual abstinence or acceptance of contraception use; which type of contraceptive to use, how to cope with side effects.

As regards the adolescent girls the requirements are irrespective of marital status and sexual activity, must have access to curriculum-based, age-appropriate sexual education. This can be achieved via advocacy on diverse media platform including through parents, peer groups, school teachers, mass and electronic media. Service providers should be trained and encouraged to avoid denying them of their right to receive comprehensive and confidential information on pregnancy prevention with abstinence, delay in sexual initiation and contraceptive counselling and services in order to make informed decision on contraceptive choice.

The information should be factual viz—while hormonal contraceptives are effective in preventing pregnancy, they do not prevent STDs and AIDS. Current ongoing evidence suggests that any adolescent girl who takes hormonal contraceptives before her first pregnancy runs the risk of breast cancer later in life. The female condom is only poorly protective against pregnancy and HIV. The male condom is only moderately protective against pregnancy and HIV. She should also be tutored on the adverse effects of latex. Knowledge of these facts may influence her to decide on abstinence until she is married or ready to want a pregnancy. The girl should also be accurately counseled on the adverse health and socio-economic consequences of early pregnancy (that is before age 20) and abortion.

The ethical requirements are that informed consent must be voluntarily obtained and devoid of undue inducement and coercion.[157] It is also described as the principle of 'respect for persons' which acknowledges that individuals with capacity have the right to make autonomous decisions. The capacity for autonomous decision-making varies considerably across cultures and stages of

adolescence. Under the Nigerian constitution, a person under 18 years is defined as a minor.[159] The Child Rights Act however, provides that a child who has attained the age of 16 years has the right to give consent for scientific investigation without parental consent.[160] Therefore the law considers that such persons have limited legal capacity and, in many situations, require a legally authorized surrogate decision maker (parent, guardian or family member) to act on their behalf. The constitution also recognizes married adolescents who are below the age of 18 years as emancipated minors. An emancipated minor refers to any person below the age of 18 years who: (a) has been granted the status of adulthood by a court order; (b) has lived independent of parental guidance for a minimum of one year; (c) is married; (d) is living in the street; or is the head of a household.[161] Furthermore it is recognized that a constitutional pronouncement supersedes all other ordinances and pronouncements. The Nigeria Constitution and the section 277 of the 303 Child Right Act[161] define a minor as a person under the age of 18. This implies that people under the age of 18years have limited legal capacity and are vulnerable to decision making that is not fully competent. They therefore need a legally authorized surrogate decision maker—usually a parent/guardian to act on their behalf.

In Nigeria, the perceptions and opinions of many policy makers, public opinions leaders and gatekeepers are sometimes not supportive of discussion of sexual issues among adolescents—it is assumed adolescents will be more promiscuous if they learn about sexuality and prevention of HIV/AIDS. Open discussions about adolescents and issues that related to them are limited and conservative. Furthermore, unlike the USA and other western nations adolescents do not leave the home/custody/responsibility of their parents to live independent lives until they have passed the adolescent stage and more often until they are married.

Irrespective of the laws and guidelines, there are *very strong* religious, cultural and social issues that support the need for parental consent prior to adolescents' exposure to contraceptives. These religious, cultural and social issues may become the main consideration in the question on the morality of adolescents engaging in pre-marital sex. Globalization/civilization or legal instruments usually do not succeed in eroding or influencing deep-rooted and highly conservative religious/moral/cultural societal convictions of a people, particularly when it has to do with the morality of the girl child. This scenario is eminently revealed in the study by Akpor et al[162] on professional nurses and educators. If the scope of the issue of adolescent pre-marital sex and abortions are consciously brought to the consciousness of parents/guardians, it will most likely strike a responsive cord and they [parents] will ensure that they take their divine responsibilities seriously to bring up their children in the tenets of the faith. This subject is discussed in greater details under Recommendations and Prevention. No one can love a child more than his/her biological parents. Parents/legal guardians are most likely to take decisions based on the child's best interest which are to refrain from pre-marital sex and conclude her education without the hindrance of pregnancy nor abortions and to enjoy good health throughout her life-course without the burden of breast cancer, STDs and HIV/AIDS which cannot be 100% guaranteed with contraceptives.

Under the Child Right Act 2003,[161] the minimum legal age of marriage is 18years. However as of May 2017 there were still 12 Nigerian States (11 of which are located in the north of the country) that did not include the Child's Right Act 2003 in their internal legislation. It follows that in those States local laws are applied, most of which are Islamic Law provisions, and the minimum age of marriage in some of those States is as low as 12 years. In 2013, the government stated that efforts have been made to sensitize states about the Child Rights Act in order to improve enforcement. There is also a lack of harmonization between the Child Right Acts 2003 which sets 18 years as the minimum age of marriage and the Sexual Offences Bill 2015 which sets the minimum age of sexual consent at 11 years. The same Federal government of Nigeria has produced another document which addresses the

issue of adolescents rights to consent to sexual and reproductive health care (including free access to contraception devices). The relevant portion of the document reads thus:[163]

"The consensus is that adolescents aged 12-14 can access SRH preventive services such contraceptive information and services but preclude treatment and care without parental consent. Young people (YP) aged 14 and above do not require parental consent for treatment and care, except when a surgical procedure is required. Only persons aged 18 years and above can give consent for a surgical procedure on themselves."

The above pronouncement in a federal government document is a most unusual construction of a statement which is expected to supersede the constitution of the land. Who constitutes *"the consensus"?* It becomes clear that the above conflicting laws as regards the sexuality and minimum age of consent of girls reflect the consequences of a predominantly male legislators making laws purely for self-interest to accommodate their individual sexual behaviours.

Section 3: Intertwined issues – Premarital sex; Teenage Pregnancy; Child Marriage

3.0 Determinants of adolescent pre-marital sex

Table 4 shows a summary of the drivers/mediators/determinants of adolescents engaging in premarital sex in Nigeria.[164-178]There is tremendous misinformation and disinformation on premarital sex and contraceptives because culturally any discourse on adolescent sex and sexuality is taboo. Superficial, incomplete, or incorrect information is acquired from peers, predators or social media.[171,172] Oyedele et al[171] explored teenagers' knowledge and perceptions regarding teenage pregnancy by using the Johnson Behavioral System Model. The research design was contextual, exploratory and qualitative in nature. The findings indicated that although schools offered sexuality education, some teenagers became sexually active *before* they received such education. One participant said:

"My parents told me that if I sleep with a man, I can get pregnant, when I was 14 years. I was also taught during my grade 10 about pregnancy, condom and other things but that was when I have already had a child." Not all were taught however; "At home nobody talks to me about sex even at school I was not taught".[171]

Young girls are deceived into engaging in early sex because they have been told by their peers and male exploiters that failure to "open up the womb" by sex at menarche results in future infertility.[172] Some men and future mothers-in-law insist prospective brides get pregnant *before* the wedding to ensure their fertility.[172] Studies have shown that one-third of teenage unwanted pregnancies would have been prevented through the elimination of exposure of the teenage girls to abuse, violence and family strife.[169] There is also the influence of media as a factor for teenage pregnancy. This is so because adolescents exposed to sexuality in the media are also likely to engage in sexual activity themselves. This finding is collaborated by *Time* when it reports that "teens exposed to the most sexual content on TV are twice as likely as teens watching less of this material before they reach age 20.[175,176]

Some mothers (widowed/poverty stricken) encourage their teenage daughters to seduce wealthy older married men for economic purposes. Some girls prefer older men, called 'sugar daddys' claiming they are more caring than young men. Some men deliberately go for adolescent girls, confident that they are "pure;" and would be 'rejuvenating' for an old man's blood.[172] Poverty stricken, or greedy girls would readily succumb to such relationships. Adolescent girls walking long distances to school are exposed to men who lure them into sex for monetary compensation.[178] Teenage orphans and vulnerable children may be at high risk of early sexual activity because they lack the guidance and supervision of adults.[165] There are reports that adolescent girls in internally displaced persons (IDPs)

camps are raped by officials responsible for distribution of food and other products.[179,180] Some of these girls have migrated to the cities in the southern parts of Nigeria from some terrorists ravaged regions in the Northern parts. These adolescents engage in any available jobs sometimes as sales attendants in bars, drinking joints, and night clubs where they are exposed to chronic alcoholism sexual exploitation and prostitution.[181] Some adolescents actively sell sex to meet their cravings and avaricious tastes, while some are rape victims; and others are engaged in cult groups.[182]

Notable additional determinants of early sexual debut are sexual coercion (rape and incest). Although gender-based violence is common in women of all ages, adolescents and youths are more greatly affected.[183,184] Adolescents worldwide often face tremendous sexual violence and rape; usually underreported in Nigeria due to the stigma attached to it.[183-185]A study conducted amongst 1,601 adolescents in Nigeria shows that 31.4% female adolescents reported forced sex (rape) at sexual initiation.[186] Significantly more female adolescents who reported being HIV positive had experienced forced sex when compared to female adolescents who reported being HIV negative.[187] Some adolescent girls from poor families are sent into the street as hawkers to augment the family income. Some of these girls are lured into sexual activities in exchange for patronage; and the poor parents are more interested in the sales than what happened to their daughters in the process. Young female hawkers who trade in motor parks in big cities are particularly vulnerable to all forms of violence and sexual exploitation. Some of these hawkers' school during the day but hawk in the evenings and on weekends for their parents/guardians. Oruboloye et al,[188] found that 15% of 467 hawkers studied in Ibadan lost their virginity to rape by older men.

Table 4. Determinants—Drivers/mediators of adolescents' premarital sex[164-178]

Categories	Sub-categories
Absent/inadequate *pre*-adolescent upbringing Parental failure	Absence of knowledge and appropriate upbringing in godly standards of morality in the *pre*-adolescent years and failure to protect the child from ungodly influences—both before adolescent and during adolescent years – parental failure
Personal and behavioral factors	Ignorance and lack of sexual information; failure to use contraceptives due to ignorance, misinformation and disinformation Covetousness/greed to sell sex Indiscipline & disregard for any moral values/standards.
Psychosocial factor	Loneliness/absence of family attachment/social ownership Low self-esteem, sexual experimentation Peer acceptance
Cultural factors	Belief in early marriage; gender inequity, Premium attached to childbearing and need to prove fertility
Societal and media pressures	Peer pressure Illiteracy Rape and incest, sexual molestation of girls by male school teachers Child harvesting/trafficking Media influence Substance use Social network, idleness, lack of recreational activities, perception of sex as a recreational activity
Family reasons	The plight of infertile women in Nigeria; family desire to have a grandchild, need for assurance of fertility Divorce and separation of parents Dysfunctional family background; Family strife, Lack of love or parental guidance, lack of ownership Living with grandparents or relatives with permissive environment Negative parental influence; parental/guardian's lack of knowledge and illiteracy—no supervision nor goal in life. Polygamy –child brides are preferred by older men in a polygamous relationship

	Gender inequities: girls are perceived as mere objects for procreation.
Economic reasons	Poverty, dating older men, social grants, cohabitation particularly in the cities; Sustaining a relationship with male friends, Street hawking due to poverty exposes girls to sexual abuse.
Armed conflict & violence, prolonged strife, crisis-affected settings	Refugee status – exposes the girls to sexual exploitation

3.1 Consequences of teenage/adolescent pregnancy

A teacher said *"There is no benefit [of teenage pregnancy] because the unborn suffers and the mother also suffers"*.[189]

Teenage pregnancy generates not only adverse consequences for mother and child but also social and economic consequences.

Early pregnancies have major health consequences for the adolescent mothers and their babies.[190–195] Complications from pregnancy and childbirth are the main cause of death among adolescent girls below age 19 in developing countries. Girls aged 15 to 19 are twice as likely to die in childbirth as women in their 20s, and girls under the age of 15 are five to seven times more likely to die during childbirth.[197] Adverse health consequences could occur: during pregnancy, during labour and delivery, immediately after delivery (postpartum) and some weeks after delivery (puerperium). Teenage pregnant women tend to have poor knowledge of reproductive health, more likely to be unbooked, unmarried with inadequate antenatal care, and poor pregnancy outcome. Inherent risks include iron deficiency anemia, high blood pressure, pregnancy induced hypertension, severe forms of malaria and higher risks of threatened abortion. Teenage mothers have poor eating habits, and depression.

Adolescent girls are at increased risk of preterm labour and delivery, eclampsia, prolonged obstructed labour, Caesarian section, increased chance of obstetric fistula—vesicovaginal fistula, and hemorrhage (excessive bleeding).[196] Girls who give birth before the age of 15 have an 88% risk of developing fistula because their pelvises are small.[196,197] Vesico vaginal fistula (VVF) is a dehumanizing condition that has high morbidity in young mothers in the rural populations in the developing countries of the world even till date.[198,199] Vesico-vaginal fistula (VVF) from prolonged obstructed labour occurs as a result of ischaemic necrosis of entrapped soft tissues between the fetal skull and the maternal pelvis which subsequently sloughs off leaving a defect between the epithelial surface of the urinary bladder and that of the vagina and occasionally involving the rectum as well.[120–102] Fistula leaves its victims with urine or fecal incontinence that causes lifelong complications with infection and pain.[102] Unless surgically repaired, obstetric fistulas can cause years of permanent disability, shame to mothers, stigmatization, divorce and social exclusion.[101] Efforts to repair the fistula further places great demands on the scarce clinical, material and financial resources of hospitals. In Nigeria alone, 800,000 to 1,000,000 women are estimated to be awaiting repair.[102] In 1985, the National Council of Women's Societies (NCWS) started a Vesico Vaginal Fistula project with assistance from Ford Foundation.[103]

Immediately after delivery, teenage girls are at increased risk of postpartum eclampsia and postpartum hemorrhage. Puerperium is the period of about six weeks after childbirth during which the mother's reproductive organs are expected to return to their original non-pregnant condition. A teenage mother is at higher risk of puerperal endometritis (infection of the womb), systemic infections, and anemia due to excessive blood loss during childbirth than women aged 20-24 years. They are also prone to puerperal depression, poor eating habits, exhaustion, and poor lactation. Mothers under the age of 18 years have 35 to 55% increased risk of delivering pre-term. The babies are at risk of low birth weight and premature at birth than a mother who is 19-24 years old. In addition, infant mortality rates are 60% higher when the mother is under 18 years old. Infants born to child mothers tend to have weaker immune systems, face a heightened risk of malnutrition and death.[104,105] The mortality rates for the infants of adolescent girls are higher as well, partly because of the adverse health events in the mother in pregnancy, labor and delivery; from poor maternal nutrition and breast feeding, low birth weight and prematurity, improper care and severe neonatal conditions.[105,106]

Social and economic consequences of teenage pregnancy

Adolescent pregnancy can be devastating with teenagers facing social issues such as poverty, poor education, poor health, single parenthood, and poor parenting. Social consequences for unmarried pregnant adolescents may include stigma, rejection or violence by partners, parents and peers. Girls who become pregnant before the age of 18 years are more likely to experience violence within a marriage or partnership. Adolescent pregnancy and childbearing often lead girls to drop out of school, jeopardizing the girls' future education and employment opportunities.[107–112]

Adolescent single parenthood often generates street children "runaway" children:[112] those who live and work on the street, and those who merely work on the streets full or part-time but retire daily to their homes. Street children work as vendors or hawkers, beggars, cobblers, car-washers and head-loaders, scavengers, street traders and bus conductors. They deal with complexities such as violence, police arrest, robberies of savings, health problems, community disapproval, inability to cope, high degree of poverty, aggression, anxiety and abuse and lack of attachments. They are involved with anti-social behavior like drug abuse depending on the socio-economic characteristics of neighborhood.[112]

Conclusion on teenage pregnancy

Teenage pregnancy is a monstrous issue in Nigeria and is driven by several cultural, socio-economic and environmental factors. Notable among the determinants are poor parenting, exposure of teenage girls to abuse, violence and family strife, negative media influence, peer acceptance, substance abuse, poverty, readiness to sell sex, sexual coercion (rape and incest), child harvesting, street hawking, and female secret cult groups. The adverse consequences of early sexual debut and teenage pregnancy are equally grave on the pregnant girl, her child and society.

3.2.1. Child Marriage: Consequences of Child Marriage

Definition and Scope

Child marriage is a formal or informal union where one or both parties are under the age of 18.[213,214] Child marriage is the norm in some cultures in Nigeria where girls are betrothed at, or before puberty. Although child marriages is a global scourge, Nigeria has the 11th highest prevalence of child marriage in the world, and the third highest absolute number of women married or in a union before the age of 18 in the world.[215] Forty-three percent of girls in Nigeria marry before their 18th birthday and 16% before age 15.[215,216] Child marriage in Nigeria is driven by a mix of factors which include gender norms, strong socio-cultural, feudal/religious traditions, poverty, polygyny, poor education[217,218] and protracted conflict.[219] A study was conducted in Gombi, Adamawa State, Northern Nigeria[216] where 59.0% were Moslems and 41.0% were Christians. There were expressions of anxiety by fathers of

child brides over breakdown of long-held family and community values, the need to preserve virginity, prevent prostitution, unwanted teenage pregnancies, abortion, childlessness, and perceived "unwholesome" Western values that allow what is considered unnecessary freedom for young girls and high adolescent sexual networking necessitating use of contraceptives.[220]

3.2.2. Consequences of Child Marriage

Child marriage attracted international attention over the last decade due to its links to a variety of development priorities, including economic development and poverty alleviation, as well as health, human rights, and social justice.[215,221]

3.2.3. Adverse health consequences

Child brides experience all the adverse health consequences of pregnancy already highlighted under Teenage Pregnancy. Child marriage is linked to high maternal and child deaths through early pregnancy and child birth, including vesico-vaginal fistulae[222,223,224] and all its attendant sequelae for the young mother who is simply ostracized if no surgical repair is forthcoming.[217] The adolescent girl is at risk of STIs, including human papilloma virus (HPV) and HIV from her husband and later cervical cancer from HPV.[225-228] The age disparity between a child bride and her husband, in addition to her low economic autonomy, further increases a girl's vulnerability to HIV/AIDS.[229,230] It reduces the abilities of girls and women to make and negotiate sexual decisions, including to engage in sexual activity, issues relating to the use of contraception and condoms for protection against HIV infection, and their ability to demand fidelity from their husbands. Communities who practice female genital mutilation (FGM) are more likely to practice child marriages: It is common for a man to refuse to marry a girl or woman who has not undergone FGM, or to demand that FGM is carried out before marriage.[231]

3.2.4. Psychological and social consequences.

It is a huge responsibility for a young girl to become a wife and mother, which they are not adequately prepared for. This seriously impacts on their psychological welfare, perceptions of themselves and their relationship. Abuse is sometimes perpetrated by the husband's family and the husband himself, and the girls often become domestic slaves for the in-laws. Early marriage has been linked to wife abandonment and increased levels of divorce or separation, early widowhood as the husband is often considerably older. The wife suffers additional discrimination as in many cultures: divorced, abandoned, or widowed women suffer a loss of status, and may be ostracized by society and denied property rights. The confiscated children of a widowed child bride suffer the double jeopardy of being orphaned and the precarious life of living with little known and uncaring paternal relations—a trigger for run-away kids – street children.[232]

3.2.5. Child marriage disempowers women and girls economically

Child marriage often ends a girl's education, particularly in impoverished countries.[233] Girls who have only a primary education are twice as likely to marry before age 18 than those with a secondary or higher education, and girls with no education are three times more likely to marry before age 18 than those with a secondary education.[234] Early marriage impedes a young girl's ability to continue with her education or learn skills as most drop out of school following marriage,[235] to focus their attention on domestic duties and having or raising children. Without education, girls and adult women have fewer opportunities to earn an income and financially provide for themselves and their children. This makes girls more vulnerable to persistent poverty if their spouses die, abandon them, or divorce them.[236] Without an income of their own, child brides depend on their husband and are often unable to leave the marriage.[237] This situation is also supported by country economic indicators for measuring

the health of the economy: several countries with very low gross domestic products (GDPs) tend to have higher rates of child marriage.[238]

3.2.6. Increased vulnerability to domestic violence

Global estimates published by WHO indicate that about 1 in 3 (35%) of women worldwide experienced either physical and/or sexual intimate partner violence or non-partner sexual violence in their lifetime.[239,240] Married teenage girls with low levels of education suffer greater risk of social isolation and domestic violence than more educated women who marry as adults.[239] The transition to married life may result in a young girl dropping out of school, moving away from her family and friends, and a loss of the social support with severe mental health implications including depression.[240]

Large age gaps between the child bride and her spouse makes her more vulnerable to domestic violence and marital rape.[241] The husband's power and control over his wife can contribute to prevalence of spousal violence.[242] Domestic and sexual violence has lifelong, devastating mental health consequences including depression and suicidal thoughts for young girls because they are at a formative stage of psychological development.[236,243] She is not permitted to return to her parents who have irrevocably collected a bride price; another dimension of slavery as the girl is literally 'imprisoned' to a state of subjugation to a man empowered by a sense of entitlement.[244]

Situations of conflict, post conflict, displacement, the pandemic incarceration, and confinements at home may exacerbate existing violence such as by intimate partners. Violence against women impairs or nullifies the enjoyment by women of their human rights and fundamental freedoms.[245] Violence against women is an obstacle to the achievement of the objectives of equality, development, and peace.

Nigeria is one of UN Member States that have committed to ending gender-based discrimination and violence against women through ratification of convention on the Elimination of All Forms of Discrimination against Women (CEDAW), and by signing on the Beijing and Millennium Declaration and UN Security Council Resolutions that address the gendered dimensions impact of conflict (UNSCRs 1325, 1820, 1888 & 1889). It is essential to close the gap between commitment and action in the form of laws, policies, services, and budgets to provide adequate protection and access to justice.

According to BAOBAB for women's Human Rights, cited by the Danish Immigration Service, there are reports of young women escaping forced marriages in the northern and southern parts of Nigeria.[246] In 2005, Amnesty International (AI) reported that, in Nigeria, a girl who attempts to run away from her husband or his family risks "harsh punishment" including acid bath with intention of mutilation or murder.[247] They are often unable to seek protection from their own family who arranged the marriage. A 2002 report on women's human rights in Nigeria indicated that young girls forced into marriage is one of the causes of prostitution in Northern Nigeria as girls flee their marital homes and take refuge in brothels in urban centres.[248]

3.2.7. Child Marriage is a Violation of human rights

A child's inability to consent to a supposed lifelong journey raise questions regarding its legality. Large spousal age differences are common and may limit married girls' autonomy and decision-making ability. In Nigeria, the mean age difference between spouses is 12·0years if the wife married before age 15, compared to 8·5years if the wife married at or after age 20.[249] Spousal age differences are even greater when the girl is a second or third wife. In polygynous marriages, the mean age difference between spouses is 15·3years, compared to 8·8years in monogamous marriages.[250]

The United Nations, through a series of conventions has declared child marriage a violation of human rights.[236,251] The Convention on the Elimination of all Forms of Discrimination of Women ('CEDAW'), the Committee on the Rights of the Child ('CRC'), and the Universal Declaration of Human Rights form the international standard against child marriage.[236] Child marriages violate a range of women's interconnected rights such as equality on grounds of sex and age, to receive the highest attainable standard of health, to be free from slavery, access to education, freedom of movement, freedom from violence, reproductive rights, and the right to consensual marriage.[252,253,254]

Cohabitation – when a couple lives 'in union', as if married – raises the same human rights concerns as marriage.[253,255] When a couple cohabitates, the assumption is often that they are adults, even if they are less than 18 years. The informality of the relationship raises concerns about inheritance, citizenship, and social recognition for children in such unions.

A focal group study by Adedokun et al,[225] gave tremendous insight into issues like decision-making in child marriage between a child-bride and her husband. The woman's economic status depends on her husband: he provides all her daily needs and her children's, even when she is involved in some employment trade or farming which belongs to the husband. Husbands determine all issues of fertility including family size, use of contraception, when and where to register for ante-natal care even when injurious to the health and wellbeing of the bride. Male children are favored, and the wife would continue to be impregnated for as long as the husband wants a male child or more male children.[225]

The study in Gombi,[225] revealed that maternal morbidity is very high because the uptake of opportunities for antenatal and post-natal care was reportedly low due to distance from health facility, cost, husband's attitude, and ignorance. Birth-spacing is not deliberately practiced and contraceptive use is almost non-existent. While there are no locally collated figures, health personnel confirmed a high and increasing frequency of maternal deaths involving young mothers in and outside health facilities in the study areas.[225] Those with little education before marriage were unable or poorly equipped to take appropriate reproductive health decisions important in reducing pregnancy-related complications.

3.2.8. Child marriage hinders the prosperity of countries and communities

Some researchers and activists note that high rates of child marriage prevent significant progress toward each of the eight Millennium Development Goals and global efforts to reduce poverty due to its effects on educational attainment, economic and political participation, and health.[243] By far the largest economic cost related to child marriage is from its impact on fertility and population growth. By contributing to larger families and, in turn, population growth, child marriage delays the demographic dividend that can come from reduced fertility and investments in education. In groundbreaking new research from the World Bank and the International center for Research on Women (ICRW), the cost of child marriage in developing countries was calculated to be in trillions of dollars by 2030.[256-258] The 2017 World Bank/ICRW study estimated that ending CM could generate Nigeria an additional USD 7·6 billion in earnings and productivity. These are additional arguments for *Girls Not Brides* members and others to convince governments, donors, and development agencies to show that ending child marriage could help progress towards the Sustainable Development Goals.

3.2.9. Conclusion on consequences of child marriage

In conclusion, the girl child is denied a fundamental human right like *acceptance* when her biological father shows favoritism and preference for a male child, regards the girl as an economic burden, denies her education and inheritance rights and quickly marries her off as the 'liability' of another man.[259] The girl child is denied the much-needed care and *social security,* childhood companions and friends, to a helpless lifetime of domestic and sexual subservience. The girl child is denied *identity* to

live under the shadow of her husband who has no relationship/fellowship with her other than sex and rearing children. The girl child is denied her *purpose* in life as she has been stripped of all opportunities of self-actualization to identify and hone her God- given talent to the services of God, her family and humanity. Within marriage the girl child is subjected repeatedly to highly perilous and traumatic pregnancies and childbirth which may terminate her life prematurely, in addition to the physical violence inflicted on her by her husband. It is useful to use girl-led campaigns for gender equality.

3.2.10. Benefits of ending child marriage

Child marriage undermines nearly every Millennium Development Goal: eradicating poverty, achieving universal primary education, promoting gender equality, improving maternal and child health, and reducing HIV and AIDS. These are spelt out in international agreements such as the Convention on the Elimination on All Forms of Discrimination Against Women (CEDAW) and the UN Convention on the Rights of the Child (CRC). Delaying marriage positively affects development in these ways: Maternal and Infant Health; Reduced cases of HIV and AIDS; Reproductive Health and Well-Being of Women and Girls; Education and Economic Opportunities.[260] Education is a social instrument that can help Nigeria tackle teenage pregnancy and child marriage

One important benefit from ending child marriage is restoration of the fundamental human rights of the girl child. Each year of secondary education reduces the likelihood of marrying before the age of 18 by five percentage points or more in many countries; and a better chance for safety and security, to health and education, and to make their own life choices and decisions. The World Bank estimates that if child marriage is ended between 2016 and 2030, over 2 million children could survive beyond age of five, 3·6 million could avoid stunting, and 140,000 children's lives could be saved averagely every year. In addition to the clear human imperative, globally the estimated annual benefits from ending under-five mortality and stunting would be up to $98billon by 2030.[260]

Ending child marriage would reduce total fertility rates by averagely 11%,and population growth over time. The analysis suggests that globally, by 2030, gains in well-being for lower population growth could reach more than $500 billion annually. Governments from the 18 countries studied could save up to $17 billion per year by 2030 from savings related to provision of basic public education, access to healthcare and other services. It has been documented that if child marriage had ended in 2015, the global economy would have saved $566 billion by 2030.[261]

Better educated women tend to be healthier, participate more in formal labor market, earn higher incomes, have fewer children, marry at a later age, and enable better health care and education for their children.[262-267]

4. Discussion, Conclusion and Recommendations

There is sufficient evidence that hormonal contraceptive is a breast cancer risk factor particularly among African American women who begin use before 20 years of age or before first pregnancy. Black-White racial disparities in breast cancer subtypes have been identified and are etiologically distinct. Nigerian breast cancer patients have identical subtypes clinical and behavioral characteristics as African Americans, i.e. triple negative tumors, early age of onset, clinically aggressive more resistant to treatment and poor prognosis.

Data from Nigeria show that 37.4% adolescent girls engage in high-risk sexual behavior. For adolescent girls dual use of condom and other hormonal contraceptives have been recommended to prevent pregnancy and acquisition of STI/HIV. A study of the types and dynamics of contraceptive use among adolescent girls show that unplanned pregnancies among adolescents happen despite the

best of contraceptive intentions, and the effectiveness of adolescent pregnancy prevention programs remain below desired levels. Adolescents' success in avoiding pregnancy often depends on having access to contraceptive information, methods and services. Contraceptive continuation over sustained periods of time is not assured, and discontinuation occurs for reasons of failure, method features, such as side effects, convenience of use, or change in need. Some women stop using altogether or immediately switch to another method, whereas others experience a gap in pregnancy protection of a month or more. Discontinuation is a particularly important issue for adolescents and young women because they tend to have more limited access than older individuals to family planning, as well as more unpredictable, infrequent and irregular sexual activity, and are probably less knowledgeable about how to use contraceptive methods effectively. According to a study of six developing countries, women younger than 25 were more likely than others to stop using their contraceptive method after 24 months.

Adolescent girls in Nigeria have uncensored/unfettered access to all the mix of contraceptives. Adolescents have at least six sources of access to contraceptives: (1) Planned Parenthood Federation (PPF) youth outreach teams to schools in the cities and far-flung rural areas, (2) PPF private family planning clinics, (3) Public family planning facilities, (4) Private family planning facilities, (5) Pharmacy shops, and (6) Patent medicine stores dealers. It is critical to note that there is a formidable and dangerous subterranean engagement of adolescents with an undocumented source of provision of sexual and reproductive health (SRH) services—the patent medicine dealers—which have held adolescents captive to a pot-pourri of unorthodox products as contraceptives and abortifacients. The adolescent girls claimed the patent medicine stores were most favored and patronized by them because of accessibility, affordability, non-judgmental attitudes, and confidentiality. However, the patent medicine dealers were ill-trained to offer such services and often prescribe spurious products, such as, strong alcoholic beverages, tobacco, and hormonals which are themselves breast cancer risk factors. An urgent need at the current downward trajectory of SRH of adolescents is to research into the scope of the relevance of patent medicine providers in the delivery of alternative services of SRH to adolescents, as this may be a major focal point for reforms in the delivery of SRH services to adolescents.

A study of the determinants of early female adolescent sexual debut showed that there were serious family, community, psychosocial, social, socio-cultural, socio-economic, societal and environmental determinants that drive early sexual debut in the girl child. Furthermore, there were extremely harmful adverse health consequences for mother and child from teenage pregnancy. Teenage pregnancy also generates serious social and economic consequences for the mother, child and the society. Child Marriage generates grave consequences for the child bride and it undermines nearly every Millennium Development goal. The benefits from ending child marriage are unquantifiable. Neither teenage pregnancy nor Child Marriage are acceptable as options to be entertained in the process of avoiding the use of hormonal contraception for the girl child.

Effective interventions for adolescent girls tend to share certain characteristics, starting with planning and programming *before* or early in a crisis. Such interventions are flexible, culturally sensitive, innovative, multisectoral and integrated. An integrated approach addresses changing the behavior of the adolescent girl in *pre*-marital sex, all drivers and mediators of adolescent sexual behavior and consequences. The risks of neglecting adolescent sexual and reproductive health (ASRH) are great; a painful or damaging transition to adulthood can result in a lifetime of ill effects.

The best way to accomplish health promotion within a setting encompasses modification of activities within social frameworks that have adverse effects on the health as opposed to changing the

tendencies of individuals. According to social cognitive theory, the important aspects in development are behavior, environment, and cognition.

Adolescent sexual and reproductive health in Nigeria is highly complex and multidimensional. There is a myriad of grave personal/behavioral, religious, socio-cultural, psychological, economic, institutional, political, legal, and demographic determinants which must be identified and confronted judiciously, objectively, and comprehensively, for effective, beneficial, culturally sensitive, implementable, and sustainable interventions. The objective of the interventions at the personal/behavioral level is to ensure that the girl child enjoys optimal sexual and reproductive health in life. While there are still areas of knowledge gap for further research, at the current level of evidence-based knowledge, we can act without delay to intervene and save the lives and future of our adolescent girls. Breast cancer has a long latency and has generational implications. Adolescent sexual and reproductive health intervention aims to prevent early sexual debut, adolescent pregnancy, child marriage, STI/HIV, adverse reproductive outcomes, and ensure adolescents are not exposed to hormonal breast cancer risk factors in the process of preventing pregnancy with hormonal contraceptives. Components of prevention of adolescent pregnancy include *pre*-adolescent training of the girl on reproductive health, and eliminate marriage before age 18.

It is pivotal not to expose the adolescent girl to breast cancer risk factor by recommending hormonal contraception. The society should therefore focus on the socio-economic, cultural, and environmental factors that lead to early sexual debut necessitating the use of contraceptives. The context, drivers/facilitators of teenage pregnancy must be consciously addressed through a targeted multi-disciplinary and multi-sectoral approach. This is critical to developing upstream interventions to eliminate or minimize the need for contraceptives. Ethical issues and inconsistent/conflicting federal government legislations as regards Child Right, and Sexual Offences Bill merit special attention to save the girl child from sexual exploitation.

Finally, it is the solemn obligation of parents to give their children—both boys and girls—the instruction and correction that belong to a godly upbringing. The *pre*-adolescent period, the first decade of life, is the most impressionable period in the life of the girl child which shapes and defines the behavior and responses of the adolescent to life's choices. Since the adolescent period does not exist in abstract, a seamless transition from the *pre*-adolescent into the adolescent and adult life as a continuum is critical. This involves *initiation* of actions/interventions when sons and daughters are largely under the ambience and supervision of parents/guardians *before* the crisis stage. The Holy Scripture says: *"Train up a child in the way he should go and when he is old, he will not depart from it."* (Proverbs 22:6). Biblically, it is established that the people are destroyed for lack of knowledge (Hosea 4:6). Sound godly education is an effective strategy of inculcating in our teenage girls the value of sexual chastity. Therefore, within the Nigerian context, the *only* realistic option is abstinence from *pre*-marital sex. For the girl child this is achievable, if parents take their responsibility seriously to bring up and train their children to abstain from *pre*-marital sex. The *gold standard* is to commence the appropriate training of children during the *pre*-adolescent years and steadfastly, prayerfully and lovingly continue the monitoring in the adolescent years and protect them from ungodly influences and immoral companions.

List of Acronyms

AI – Amnesty International
AIDS – Acquired Immune deficiency Syndrome
ASRH – Adolescent Sexual and Reproductive Health
ASRH – Adolescents Sexual and reproductive health
AXP – Adolescents and young People

BRCA – The Breast Cancer Gene
CEDAW – Convention on the Elimination of all form of Discrimination against Women
CM – Child Marriage
CRA – Child Rights Act
CRC – Convention on the Rights of the Child
DCIS – Ductal Carcinoma in situ
DES –Diethylstilbestrol
DNA – Deoxyribonucleic acid
DVT – Deep Vein thrombosis
EDC – Endocrine Disrupting Chemicals
ER – Estrogen Receptor
FCT – Federal Capital Territory
FDA – Food and Drug Administration
FGM – Female genital mutilation
FMOH – Federal Ministry of Health
FP – Family Planning
GDPs – Gross domestic products
GLOBOCAN – A window-based software which provides access to a worldwide database of cancer incidence and mortality rates
HER – Human Epidermal Growth Factor Receptor
HIV – Human Immunodeficiency Virus
HPV – Human Papilloma Virus
Her-2R – Human Epidermal Growth Factor Receptor 2 in Gene
IARC – International Agency for Research on Cancer
ICRW – International Center for Research on Women
IUD – Intra-Uterine Device
IUD – Intrauterine device
LARC – Long-Acting Reversible Contraceptive
LARC – Long-Acting Reversible Contraceptive
LARC – Long-Acting reversible Contraceptive
LMIC – Low and middle-income countries
MDG – Millennium Development Goals
NARHS – National Reproductive Health Survey
NARHS/SARHS – National and State Specific HIVE and AIDS Reproductive and Child health Survey
NCI – National Cancer Institute
NGO – Non-Government Organization
NTP – national Toxicologic Program
PPF – Planned Parenthood Federation
PR – Progesterone Receptor
SHR – Reproductive Health Services
SOB – Sexual Offences Bill
SPSS version 20
SRH – Sexual and Reproductive Health
STD – Sexual Transmitted Diseases
STI – Sexually Transmitted Infection
UN – United Nations
UNFPA – United Nations Population Fund
UNFPA – United Nations Population Fund

USD – United States Dollar
WHO – World health organization
YP – Young Persons

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