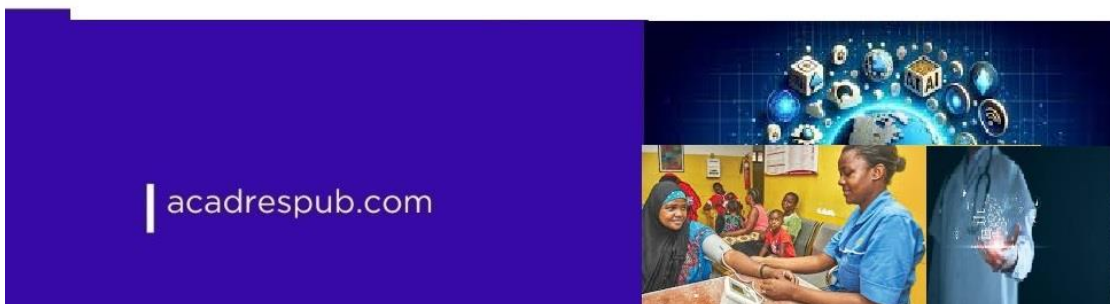




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EFFECTS OF SHORT MESSAGE SERVICE-AUGMENTED SEXUALITY EDUCATION INTERVENTIONS ON UTILIZATION OF YOUTH-FRIENDLY SEXUAL AND REPRODUCTIVE HEALTH SERVICES AMONG YOUTHS IN BENIN-CITY

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ABSTRACT

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This study examined the effect of SMS-augmented sexuality education on youths' awareness, knowledge, attitudes, and utilization of youth-friendly sexual and reproductive health services (YFSRHS) in Benin City, Nigeria. However, access to and utilization of these services remain low in many settings. A mixed-methods approach was adopted, beginning with a needs assessment conducted among 426 proportionately sampled youths from two purposively selected communities, alongside qualitative interviews with healthcare providers and community members. A quasi-experimental design was subsequently implemented using 152 youths selected from the needs-assessment sample and assigned equally to intervention and control groups based on age and gender. Quantitative data were collected using an adapted and validated self-administered questionnaire derived from the Nigeria Demographic and Health Survey and WHO Cleland's illustrative tools. Pre- and post-intervention surveys were analyzed using descriptive and inferential statistics. The intervention group received SMS-augmented sexuality education messages over a six-week period, while the control group received no intervention. Baseline findings revealed no statistically significant differences between the intervention and control groups in awareness, knowledge, attitudes, or utilization of YFSRHS ($p > 0.05$). Following the intervention, youths in the intervention group demonstrated statistically significant improvements in knowledge, attitudes, and utilization of YFSRHS compared with the control group ($p < 0.001$). Although awareness levels did not change significantly, significant gains were observed within the intervention group between pre- and post-tests for knowledge, attitudes, and utilization ($p < 0.01$). Qualitative findings corroborated these results, highlighting improved access to information and increased engagement with YFSRHS through confidential SMS platforms. Minor improvements observed in the control group were attributed to pre-test exposure and participant curiosity. The study concludes that integrating SMS-augmented sexuality education into YFSRHS programs is an effective and scalable strategy for enhancing youth engagement and service utilization, consistent with the Health Belief Model and the Theory of Reasoned Action.

Key words: Effects, Short Message Service (SMS), Sexuality Education, Augmented, Utilization, Youth- Friendly Sexual and Reproductive Health Services

Introduction

Youth-Friendly Sexual and Reproductive Health Services (YFSRHS) is a program designed to deliver comprehensive range of sexual and reproductive health services to youths in ways that are responsive to their specific needs, vulnerabilities and desires (WHO, 2016; Akande, Muzugaba, Igunbor, Elimian, Bolarinwa & Musa, 2024). But data kept showing poor utilization of the services and this has been attributed to challenges such as lack of awareness, social stigma and limited resources. Poor utilization according to reports had been implicated in high rates of unplanned pregnancies, unsafe abortions and sexually transmitted infections (STIs) among youths (Ninsiima, Chiumia & Ndeji, 2021; Tazinya, Hajjar & Yaya, 2022). Reports have indicated that youths, not being able to access contraceptives led to 7.6 million unplanned pregnancies in 2019 (UN, 2020; Ninsiima, et al, 2021). In 2019 unplanned pregnancies resulted in 3.7 million unsafe abortions (UN, 2020). In 2020, about 17 million unmarried girls within the ages of 15-19 years gave birth (WHO, 2021).

Globally, complications associated with pregnancy and childbirth were implicated as major causes of death among unmarried girls aged 15-19 years (WHO, 2022)

The use of Short Message Service (SMS) is widespread among youths in Nigeria and majority of these youths have used the internet to seek health information (ITU, 2021). Thus, integrating SMS into Youth-Friendly Sexual and Reproductive Health Services program can increase opportunities for youths to receive important health information. out of which 85.4% was performed on youths aged 15-24 years (United Nations (UN), 2020). More so, complications associated with pregnancy and childbirth were implicated as major causes of death among females within this age bracket. UNAIDS (2020), stated that this group of youths accounted for over 42.5% of new cases of HIV infections and about 80.4% of the youths living with HIV lived in Sub-Saharan Africa. World-wide, it is estimated that one in every seven (7) persons is among this group of youth and this period is followed by series of physical and psychological changes that have effects on sexual and reproductive health (United Nations (UN), 2020). Between 2015 and 2020, a total of 10,500,000 unplanned pregnancies among youths were recorded in Nigeria, out of which 1,430,000 ended in criminal abortions, (Tazinya, Hajjar & Yaya, 2022). Youth is a stage of transition in life. It is a period between childhood and adulthood in which there are significant changes in social interactions and relationships (Ihesie & Ogochukwu, 2020). Youth is not a homogenous group of persons, as life at this phase of growth and interactions vary by age, sex, religion, culture, class and marital status.

In the same way, sexual and reproductive health needs of the youth vary greatly across the various groups. Youths aged 15-24 years constitute about 15% which is estimated to be 1.2 billion persons out of a total world population of 7.9 billion in 2021. Over 4/5th of this group of youths lived in developing countries (Population Reference Bureau (PRB), 2020). According to AYA and Pathfinder, (2020) youths across the globe are attaining puberty earlier, engaging in early sexual activity and getting married later. Hence, their sexual and reproductive health cannot be neglected. The upsurge in the rate of liberal sexual activity with its subsequent implications for sexual and reproductive health among the youth, especially in sub-Saharan Africa, suggests that there is need for adequate and urgent attention towards sexual and reproductive healthcare (Adione, Abamara & Vivalya, 2023). The developmental stage of the youth is associated with the challenge of poor access to sexual and reproductive health information as parents and teachers failed to address the issues based on socio-cultural and religious beliefs around chastity. This has led to circumvention of responsibility on who should offer such information to the youth. In effect, youths tend to adopt poor sexual and reproductive health (SRH) choices which in most cases resulted in negative outcome. Ignoring SRH needs of the youth may lead to fatal health challenges, with long-term consequences for them, their families, communities and society at large. There is a high unmet need for unmarried youths in sexual and reproductive health in the entire world (UN, 2020). For instance, there were challenges that had been identified in accessing SRH services among which are limited sources of reliable information about the services, religious, cultural, legal consideration and social stigma surrounding the use of some of the services such as family planning, HIV testing and counselling.

Youths kept involving themselves in secret liberal sexual activities, hence, during the International Conference for Population and Development (ICPD) of 1994, in Cairo, it was pointed out, that reproductive health needs of the youth had been largely underscored by existing health, education and other social programs. Having reached a consensus at the conference, the issue of adolescent SRH was put on the international agenda. This was followed by a plan of action that formed the basis for programs addressing the SRH needs of youths that was adopted for global implementation (WHO, 2016). Among the strategies that were recommended for adoption and implementation for solving the SRH problems of the youth, was the establishment of Youth-Friendly Sexual and Reproductive Health Services (YFSRHS), which became the major strategy for addressing the SRH needs of the youth worldwide (UN, 2020). Youth friendly sexual and reproductive health services (YFSRHS) are services

that deliver a comprehensive range of sexual and reproductive health services in ways that are responsive to the specific needs, vulnerabilities and desires of the youth. YFSRHS interventions are promising, cost-effective approaches to delivering sexual and reproductive health services to youths. The services are designed to address the challenges faced by youths in accessing sexual and reproductive health services. The services accommodate youths' distinctive requirements and are drawn from policies and attributes that can effectively attract youths, create comfortable and appropriate healthcare setting that will meet their needs responsively and retain them for continuing care (FMOH, 2020). The services are expected to be accessible, acceptable, affordable, safe, effective, given in the right places and appropriate for the youths. When necessary, the services may even be given for free and given in the right style that is acceptable to the youth.

Health services that can meet these expectations are regarded as youth-friendly services (YFS) (WHO, 2016). The components of YFSRHS services include information and counselling on family planning, promotion of healthy sexual behaviors, sexual and reproductive health issues, testing and management of STIs, testing for HIV and counseling. Others include ante-natal care and delivery, post-natal care, post abortion care and referral services. However, subsequent reviews of YFSRHS showed that teenage pregnancies and births, abortions and STIs-including HIV infections were still on the increase, especially in Sub-Saharan Africa where rates of more than 125 births/1,000 youths aged 15-19 years were recorded and this was linked to either non-availability or under-utilization of healthcare facilities and services (AYA, 2020). Many of the barriers that youths encounter in accessing sexual and reproductive health services are unique to them. This is due to their developmental stage and associated special needs, perceptions and abilities.

Nigeria was among the first in Sub-Saharan Africa to make adoptive policy statements that addressed the issues of YFSRHS for the youths in accordance with the world-wide trend of robust advocacy for reduction of SRH challenges in various nations of the world (FMOH, 2019). The sequence of policy initiatives and pronouncements included the fact that in 1998, Nigeria approved the Regional Reproductive Health Strategy and endorsed all the components of YFSRHS as established on ICPD platform for action. The only action that was not adopted was 'The provision of safe abortion services', which is against Nigerian law (Okonkwo, Onwujekwu & Ani, 2020). Meanwhile, access to contraception at the community level depended on the marital status of the youth. For those who were not married, communities' attitudes toward contraception were followed by social stigma, as such, the youths who were not married were

less likely to demand for reproductive health services (RHS) but kept being involved in secret sexual activities (Mazur, Brindis & Decker 2021).

Edo State adopted and implemented YFSRHS between 1998 and 1999. The services were incorporated into existing Primary Health Care centers, with the main aim of advancing the health and well-being of the youths. However, there have been reports on poor demand for the services where available (Abebe & Awoke, 2020; Esiet, 2021). Based on the poor reports, challenges were identified, giving rise to a new strategic framework that was designed, adopted and implemented between 2012 and 2013 to address every aspect of the health of youths, to improve their demand for YFSRHS. The new framework, in addition to sexual and reproductive health, addressed other areas such as education, nutrition, drug abuse, mental health and career development. With all these additional units, the services were still under-utilized.

Statement of Problem

Youths face challenges in accessing sexual and reproductive health services. The challenges as identified included limited awareness, social stigma, issues of confidentiality and limited resources. Others were inconvenient hour of service and judgmental attitude of some healthcare workers. These have been reported to have contributed to poor sexual and reproductive health outcomes which included unplanned pregnancies, unsafe abortions and sexually transmitted infections (STIs) (Akande, et al, 2024). Addressing these challenges is important in ensuring that youths are empowered with knowledge to make informed decisions about their sexual and reproductive health for improved health outcomes and contributions to overall wellbeing of the communities. Edo State adopted and implemented YFSRHS between 1998 and 1999. Recent visits to YFSRHS facilities in Benin showed poor records of demand for the services, visit to the State Bureau of Statistics revealed records of high rates of sexually transmitted infections (STIs), early and unplanned pregnancies and unsafe abortions among youths, while utilization of YFSRHS showed poor record of less than 15%. (SMOH 2022).

Traditional sexuality education programs have been implemented to address the gaps, but their impact on service utilization is often limited by poor accessibility, inconsistency, engagement and inadequate follow up mechanism. In this digital age, mobile technology has become an essential aspect of youths' lives, giving a unique opportunity to bridge the gap in utilization of sexual and reproductive health services. Short Message Service (SMS) is a cost-effective and accessible communication tool that can promote targeted information, reminders and confidential support to

address the unmet needs of youths. However, there is limited study on how SMS-Augmented sexuality Education interventions can be effectively offered to improve youths' awareness, reduce social stigma and enhance access to youth-friendly sexual and reproductive health services. Thus, this study assessed the effects of SMS-augmented sexuality education as an innovative solution to increase utilization of youth-friendly sexual and reproductive health services

Objectives of the Study

The main objective of this study was to assess the effects of SMS-augmented sexuality education intervention on utilization of YFSRHS among youths in Benin-City, Edo State.

The specific objectives of the study were in two phases

- Phase one (Need Assessment Phase)

The specific objectives were to:

1. Determine the perceived effectiveness of SMS-augmented sexuality education intervention on utilization of YFSRHS among youths in Benin-City, Edo State
2. Develop culturally, appropriate and tailored SMS-Augmented sexuality education for improvement in awareness, knowledge and utilization of YFSRHS.

Research questions (phase 1)

What is the perceived effectiveness of SMS-augmented sexuality education intervention on utilization of YFSRHS among youths in Benin-City, Edo State?

What are the culturally, appropriate and tailored SMS-Augmented sexuality education for improvement in awareness, knowledge and utilization of YFSRHS?

- Phase two (Quasi-Experimental Design)

Can SMS-Augmented sexuality education intervention, improve awareness and utilization of YFSRHS?

What are the experiences of the participants while seeking youth-friendly sexual and reproductive health services among intervention and control groups before and after intervention?

Hypotheses

1. There is no significant difference in awareness of participants on YFSRHS among intervention and control groups before and after intervention.
2. There are no Significant differences in awareness, knowledge and utilization of YFSRHS between pre-test and post-test results among control group only

The significance cuts across the various strata of the society and these are:

Youths

This study holds considerable importance across different segments of society, particularly among youths. It is designed to equip young people with awareness, knowledge, skills, attitudes, and values that will empower them to realize optimal health, well-being, personal growth, and dignity. By fostering greater understanding of respectful social and sexual relationships, the intervention encourages youths to consider how their decisions impact both their own well-being and that of others. It also aims to ensure that young people are aware of and able to protect their fundamental rights.

A key outcome of the intervention is enhanced access to and utilization of youth-friendly sexual and reproductive health services (YFSRHS), which are vital for both physical and psychological health. Through targeted awareness campaigns, the study will increase knowledge about safe sexual practices and close existing information gaps regarding service modalities, content, and the challenges youths encounter when seeking care.

Specifically, the intervention is expected to contribute to the prevention of sexually transmitted infections (STIs), including HIV/AIDS, by increasing demand for and use of appropriate services and thereby promoting healthier sexual behavior. By providing accurate information and guidance on the use of YFSRHS, the program should help reduce unplanned pregnancies and improve overall quality of life for youths both individually and collectively. According to the United Nations Population Fund, effective reproductive health education can reduce unplanned births by up to 72% among youths, contributing to healthier populations and reductions in maternal and infant mortality, which in turn support stronger and more economically stable nations (UNFPA, 2021).

Additionally, by increasing awareness of early pregnancy prevention, birth control options, and infertility issues, the intervention supports youths in achieving their full potential and diminishes the likelihood that they become marginalized or burdensome within their communities.

Community

At the community level, the study will promote understanding of the importance, sustainability, and effective use of YFSRHS. It is anticipated to reduce social stigmatization of youths who access these services, decrease rates of teenage pregnancy, lower instances of unsafe abortions, and reduce the spread of

HIV/AIDS among young people outcomes that will benefit the wider community.
Society

On a broader societal scale, the study's contributions extend to improved health and well-being of youths, families, and communities. Enhanced reproductive health outcomes are linked with economic gains and may help curb the spread of HIV/AIDS—progress that aligns with global development goals such as those outlined in the Millennium Development Goals framework. By fostering informed decision-making and healthier lifestyles, the intervention may also contribute to reductions in youth crime and criminality.

Public/Community Health Nurses

Public and community health nurses play a crucial role in guiding youths toward informed choices, including abstinence and the use of contraceptives and condoms. Providing education on YFSRHS is a critical nursing function, as intervention-based reproductive health education has been associated with delayed initiation of sexual activity, reduced frequency of sexual intercourse, fewer sexual partners, and increased contraceptive use, leading to better reproductive health outcomes among youths (e.g., studies on reproductive health education interventions). Such education may also increase utilization of services and reinforce positive health behaviors.

Government

For government entities, particularly the State Ministry of Health, this study will help assess the current extent of YFSRHS utilization in Edo State. Findings could inform policy adaptations and expansion of effective interventions to additional local government areas, thereby assisting more youths in fully accessing available services. Furthermore, the research will contribute to the existing body of knowledge for public/community health nurses, healthcare professionals, policymakers, and program planners involved in adolescent health and development.

The study is titled "Effects of SMS-Augmented Sexuality Education Intervention on Utilization of Youth-Friendly Sexual and Reproductive Health Services in Selected Communities in Benin City." It was limited to youths aged 15–24 years residing in two purposively selected communities: Oredo community in Oredo Local Government Area and Ugbekun community in Ikpoba-Okha Local Government Area of Benin City, Edo State.

Literature Review

The literature reviewed covered key concepts related to sexual and reproductive health (SRH), youth sexual behavior, youth-friendly sexual and reproductive health services (YFSRHS), and intervention strategies, with particular emphasis on SMS-augmented sexuality education. Global and local evidence consistently shows that youths face increasing risks of unplanned pregnancies, unsafe abortions, sexually transmitted infections (STIs), including HIV/AIDS, largely due to inadequate access to accurate information and youth-responsive health services (WHO, 2016; UNFPA, 2020).

Sexual and reproductive health is recognized as a state of complete physical, mental, and social well-being, underpinned by reproductive rights that empower individuals to make informed decisions regarding sexuality, contraception, and childbearing (UN, 2020; Telake et al., 2024). Lack of access to SRH information and services undermines these rights and contributes to poor health outcomes, particularly among youths aged 15–24 years (WHO, 2016; Dehne & Riedner, 2019).

Globally, youths account for the highest proportion of new STI infections, with those aged 15–24 years contributing over half of new cases (WHO, 2019). In Nigeria, studies reveal early sexual initiation, low contraceptive use, and high levels of unprotected sex among youths, resulting in high rates of unplanned pregnancies, unsafe abortions, and HIV/AIDS (FMOH, 2020; Adebayo et al., 2023). Despite national policies supporting sexuality education, sociocultural and religious opposition has limited effective implementation, forcing many youths to rely on peers for information, often leading to misinformation and risky sexual behaviors (UNICEF, 2020).

Youth-Friendly Sexual and Reproductive Health Services were globally endorsed following the 1994 ICPD as a key strategy for addressing adolescent SRH needs (WHO, 2016). YFSRHS are designed to be accessible, acceptable, appropriate, effective, and equitable, offering services such as contraception, STI/HIV testing and treatment, counseling, and referral in a confidential and non-judgmental environment (FMOH, 2019; Kay et al., 2020). However, evidence from Sub-Saharan Africa, including Nigeria, indicates persistent under-utilization due to structural barriers (cost, distance, and consent policies), sociocultural stigma, and inadequate youth-friendly provider attitudes (Brindis & Decker, 2020; Elemile et al., 2023).

Emerging evidence highlights the potential of mobile health (mHealth) interventions, particularly **SMS-based sexuality education, to overcome information gaps, reduce stigma, and improve service uptake among

youths due to their privacy, affordability, and wide reach (ITU, 2021; Akande et al., 2024). However, there remains limited empirical evidence on the effectiveness of SMS-augmented interventions in improving utilization of YFSRHS in Nigeria, especially at the community level (Onukwugha et al., 2022).

The review also identified the relevance of behavioral and utilization theories such as the Health Belief Model, Theory of Reasoned Action, and healthcare utilization models in explaining youth health-seeking behavior and guiding intervention design. Despite extensive literature on SRH challenges and YFSRHS, gaps persist regarding context-specific, theory-driven digital interventions targeting youth utilization of YFSRHS, particularly in Edo State.

Overall, the literature supports the need for innovative, youth-centered, and technology-enabled interventions to improve access to and utilization of YFSRHS, thereby reducing adverse sexual and reproductive health outcomes among youths.

Utilization of YFSRHS in Edo State

Youth-Friendly Sexual and Reproductive Health Services (YFSRHS) were adopted in Edo State between 1998 and 1999 and later strengthened through national policies that integrated YFSRHS into Primary Health Care (PHC). Despite these efforts and support from organizations such as Action Health Incorporated and the Danjuma Foundation, utilization of YFSRHS by youths in Edo State remains low. Contraceptive demand among youths is below 15%, largely due to poor awareness, limited availability of services, affordability challenges, accessibility issues, and fear of social stigma.

Evidence from studies in Edo State and the wider Niger-Delta region shows that fewer than 10% of public health facilities offer functional YFSRHS. Even where services exist, they are underutilized because they are poorly tailored to youths' needs and are often perceived as services meant only for pregnant women and children. Additional barriers include long distances to facilities, costs, lack of privacy and confidentiality, judgmental attitudes of healthcare providers, and weak political and institutional support at lower levels of government. Nevertheless, civil society organizations such as the Women's Health and Action Research Centre (WHARC) have contributed to improving youth sexual and reproductive health through research and advocacy.

Utilization of YFSRHS is influenced by several interrelated factors. Socio-demographic factors such as age, sex, education, socio-economic status, and living arrangements play a role, with youths living with both

parents generally engaging less in early sexual activity, while those living alone or with guardians are more likely to seek services. Socio-psychological factors particularly knowledge, awareness, beliefs, attitudes, and perceived vulnerability strongly shape health-seeking behavior. Although many youths have basic knowledge of sexual and reproductive health risks, awareness of YFSRHS is poor, and many youths underestimate their personal risk, resulting in low service utilization and inconsistent condom use.

Organizational and health-system factors further limit utilization. These include inadequate youth-friendly infrastructure, inconvenient clinic hours, long waiting times, shortages of trained personnel, stock-outs of commodities, and lack of confidentiality. Negative provider attitudes often influenced by cultural, religious, or policy constraints—discourage youths from seeking care, especially in government-owned facilities. Overall, limited availability, poor quality of care, and weak youth engagement reduce the effectiveness of YFSRHS in Edo State.

Short Message Service (SMS)–based interventions present a promising strategy to address many of these barriers. SMS is widely accessible, private, cost-effective, and acceptable to youths in Nigeria. Evidence from multiple settings shows that SMS-based health interventions improve knowledge, increase uptake of contraceptives and HIV testing, reduce risky sexual behaviors, and enhance demand for sexual and reproductive health services. Integrating SMS into YFSRHS programs in Edo State therefore has strong potential to improve awareness, reduce stigma, strengthen confidentiality, and ultimately increase utilization of youth-friendly sexual and reproductive health services.

Use of SMS in Healthcare Delivery: Global outlook

The proliferation of mobile technology in recent years and its popularity with young people offer a form of modality to reach the youths. According to International Telecommunication Union (ITU) (2020), out of almost 6.5 billion mobile phone subscribers worldwide, approximately, 2.5 billion is under the age of 30 years. Given the proliferation of mobile phones, it is believed that they have the potential of discretely delivering tailored sexual and reproductive health content without social stigma or judgment. Globally, various mobile phone interventions have been used to connect the youths to YFSRH information and services (Kay, et al, 2020). There are numerous projects being implemented globally that leverage mobile technologies for improved youth SRH. The positive effect of SMS on sexual

behavior of the youth was addressed in a study in Australia, where it was revealed that there was a significant increase in condom use and fewer multiple sex-partners. The study participants also reported an increased consciousness and consideration of the risk for STIs, and this may have played an important role in the sexual behavioral change. The effect of SMS on sexual healthcare seeking behavior was evaluated among youths in the USA, using SEXINFO free SRH SMS information and referral services (Fjeldsoe, Marshall, & Miller, 2021). The service was instituted in response to the rising rate of gonorrhea among African American youths in San Francisco. The study also, reported a significant increase in STI testing and use of clinical services. The effect was replicated in Australia with participants acknowledging that the SMS messages changed their perception of apprehension around STI testing, thus, increasing uptake. Studies in Kenya and Tanzania have highlighted the feasibility of sexual and reproductive health content delivered to youths through mobile phones. Findings in the two countries showed that majority of the users accessing the mobile content were less than 25 years of age. The participants claimed that they liked receiving family planning information through mobile phones, as it was confidential and easy-to-understand (Engle, et al, 2019).

Fjeldsoe, et al, 2021, conducted a study on 'evaluation of the effects of SMS on sexual healthcare seeking behavior among youths in the USA, using Sexinfo, free SRH SMS information and referral services' the study was conducted in response to the rising rate of gonorrhea among African American youths in San Francisco. The result of the study showed a significant increase in STI testing and use of clinical services. The effect was replicated in Australia with participants claiming that the SMS messages changed their perception of nervousness around STI testing, thus, increasing service uptake. Examples of the services that linked technology to youth targeted SRH information dissemination included: The Young Africa Live mobile portal for discussing love, sex, relationships, gender and cultural issues, as well as HIV/AIDS in South Africa, The School-Based Learning about Living program developed around the Nigerian Family Life and HIV/AIDS education Access, Service and Knowledge (ASK) program targeting youths to disseminate information on SRH and HIV/AIDS in seven countries through mobile and electronic platforms. However, while there were evidence suggesting high acceptability of mobile phone-based sexual health education among the youths, there were minimal information that suggested that the interventions resulted in sustained change in sexual health knowledge, behavior and practices (Kumar, et al, 2020). The global health community had clearly been issuing repeated calls for evidence, particularly on the outcome of mobile phone

approaches for achieving improved health of the youths. In addition, the popularity in the use of social media by the youths, has led to the creative uses of the social media in engaging and educating the youths (Shorbaji & Geissbuhle, 2020) The radio, magazines, comics, and television have entertained young people while disseminating quality, accurate information on a wide array of sexual and reproductive health and rights issues. In other to improve the health of the youth, the World Health Organization's Department of Reproductive Health and Research partnered with FHI 360 to initiate Youth Reproductive Mobile Access and Delivery Initiative with an aim to develop and evaluate an on-demand system for youths to access and receive SRH information through SMS.

Use of SMS in Healthcare Delivery: Nigeria outlook

Nigeria has an Information and Communication Technology (ICT) that takes the integration of ICT into different sectors of the economy with health and agriculture as typical examples Nigeria has witnessed an exponential growth in mobile telecommunications since its commencement in 2001. Presently, it is Africa's largest market, with subscriptions more than 111 million, which is about 70.5% of total population (ITU, 2020.) Mobile communication has been identified as an effective means of bringing healthcare services to citizens in developing countries. It has been applauded in Nigeria that mobile phones support providers of healthcare through clients' data collection, giving counseling and health talks as well as monitoring of clients (Heavin, 2020). In Nigeria, the use of mobile phones for offering healthcare has shown to be successful in delivering health education and behavioral change interventions for the youths. More than 94% of the world's population is covered by mobile phone networks, and more than 88% of mobile phone subscribers are persons living in the developing world (ITU). Following the reduction in cost of mobile phone and growing confidence on mobile phones as essential commodity, the use of mobile phone has been on the increase, even in the poorest resource settings. A 2014 survey of 24 developing nations, Nigeria inclusive revealed that between 55% and 96% of people aged 18–24 years owned mobile phones. The overall average was 84% ownership among the youths and text messaging was found to be the most popular form of mobile phone communication, particularly among the youth. The survey also revealed that more than 52% of the population in each of the countries surveyed confirmed that they own a cell phone. Moreover, 78% of cell phone users across the 24 nations use short messaging service (SMS), making it the most popular communication method (Wike & Oates, 2020). In another study of seven (7) African countries which are Ghana, Kenya, Nigeria, Senegal, South Africa, Tanzania, and

Uganda, it was revealed that texting was substantially more popular among individuals aged 18–34 than those aged 35 years and above (ITU, 2020). Youths are responsive and enthusiastic to use modern technologies in addressing barriers such as discrimination from healthcare providers, stigmatization, lack of privacy and confidentiality, embarrassment while seeking YFSRH information and services, especially on sensitive topics (Cornelius, et al, 2021). Most significantly, mobile phones (SMS), can cushion transport challenges, offer privacy, convenience, and easy access as against face-to-face consultations with healthcare professionals. Mobile phone-based health interventions have huge possibility for improving the health outcome of the young in low- and middle-income countries. In a randomized control trial conducted in Australia, simply receiving short text messages about sexually transmitted infections improved the knowledge of the youth (Lim, Hocking, Hellard, & Aitken, 2019). In the study, receiving the information about diseases did not have a significant effect on condom use but it increased the STI testing in women. This example showed that knowledge dissemination does not automatically lead to behavior change, but that other determinants of behavior needed to be addressed to yield a change.

The outcomes of interventions are also affected by the living conditions of the target group. As stated by a study of Lim, et al. (2019), on 'mobile phone intervention for increasing skilled attendance at delivery' There was significant change in the behavior of urban youths in Zanzibar but did not have any impact on rural women. This underlines the importance of tailoring intervention to target groups. Improved knowledge on skilled attendance changes behavior only, if other factors such as high cost of products or conflicting culture or religion do not hinder it. An example is a study by Da-Costa, Babosa, Gomes, Costa, Sigulem, Marin, Filho & Pisa (2019) where midwives and participants were provided with smart phones, using videos on topics related to reproductive health to encourage conversation with their clients. Maternal and newborn health is one of the central fields of mobile phones usage, as it gives the chance to spread accurate information to a growing number of women, who are usually eager to learn the best possible practices for their future children. (Cole, Cherrian, Sonko, Shivute, Cham, Davis & Southall, 2019) An example of intervention program in Nigeria is the Youth Access to Reproductive Health (Y-Access). It is a project funded by the department for international development (DFID), and implemented in partnership with Association for Reproductive and Family Health (ARFH), Education as a Vaccine (EVA), and the Society for Women Development and Empowerment of Nigeria (SWODEN) Y-Access, works with formal and informal healthcare providers like Peer Health Educators, Traditional Birth Attendants

(TBA) and Patent Medicine Vendors to provide youth-friendly accurate, non-judgmental information and referrals on sexual and reproductive health issues. The aim of the project is to improve the quality of reproductive health services provided and to increase the capacity of youths so that they may know more about their reproductive health including where and how to access health services. The program also supports youth's access to health care services by providing free and subsidized services, educating parents, teachers and community leaders on the importance of supporting young people to access YFSRH services. Y-Access started in 2012 and operates in Benue, Niger, Jigawa and Katsina states with the aim of reaching 900,000 young people between the ages of 10-24 within a period of three years. The actual power of the Y-Access program was its sustainability. By training formal and informal healthcare providers, entire community networks were developed, to provide support for the young who has sexual health questions or require immediate support for issues like unplanned pregnancies, HIV/AIDS testing, sexually transmitted infections and other sexual and reproductive health issues confronting the young in the community. EVA is responsible for the Niger and Benue State operations, with programs in Rafi, Shiroro, Mokwa, and Mashegu local government areas in Niger State, and Kwande, Gboko, Otukpo and Vandeikya local government areas in Benue State. To reach young people in these areas.

EVA works through three platforms, which are- existing formal and informal health professionals, EVA's own peer health educators and a mobile service platform. EVA has trained 93 formal and informal health care providers from 80 health facilities, along with 177 patent medicine vendors (PMVs) and 173 TBAs to render effective sexual and reproductive health services to the young people. In addition to training these existing community resources, EVA has developed 794 peer health educators (PHEs) amongst the youths in Niger and Benue states with 398 in Niger and 396 in Benue. They have been trained on sexual and reproductive health and have reached 9,000 youths through educational sessions where the PHEs pass on their knowledge to friends and peers. The PHEs also distribute male and female condoms and refer their peers to additional health services when required (Cole et al, 2019). A third resource is the EVA mobile stand 'My Q &A'. This stand allows young people to send text messages concerning their sexual health questions and get the answers they seek, while maintaining their anonymity. Since commencement, the project is said to have received 139,000 texts and a further 2,177 calls to the supporting toll-free phone line. A study of young girls in six Nigerian states showed that 98.5% of them had access to a mobile phone, 66.6% of the number own one,

while 34% borrow from a family member-usually a sibling (ITU, 2020).

In Nigeria, like many other societies, youths encounter numerous sexual and reproductive health challenges such as uptake of contraception which for now is below 15%, resulting in underutilization of SRH services, unplanned pregnancies of about 27% that result in unsafe abortions of 34 per 1,000 cases and sexually transmitted infections of about 45% (NBS, 2020). Many of the youths in the country also experience unemployment, which is about 37.6%, engagement in risky sexual behavior of about 56.3%, limited knowledge of SRH services is about 40% and about 68% not having access to YFSRHS based on affordability in terms of finance (Frost & Driscoll, 2019). Since sexual health for the young is a taboo in most culture, the use of mobile services with regards to utilization of YFSRHS can be seen as a promising approach. In most vulnerable populations, health services are often not accessible. The possibility of coding information has the potential for enhancing individual well-being and changing harmful practices. A systematic review by Engle, et al, (2019) on "Assessment of strategies in using mobile phone to improve YFSRH of the young" showed evidence of the use of mobile phones for improving YFSRH of the young. However, there was a lack of literature on the possible barriers and facilitators to the uptake of mobile phone interventions for improving YFSRH of the young. Challenges to the demand for YFSRHS included cultural norms, lack of privacy, confidentiality, inadequate knowledge, non-affordability, social stigma and judgmental attitudes of healthcare providers towards the youths while seeking YFSRHS, despite availability of the facilities and services. (Kennedy, Harris, Humphrey, Malverus, & Gray, 2020). According to WHO (2016), YFSRHS interventions targeting the youths should be accessible, equitable, appropriate and effective (Chandra, Lenz, Adebayo, Lang, Gomez, & Chatterjee, 2018). So far, there has been improvement in creating a youth-attractive environment for YFSRHS and access to facilities, but more work is still needed (Svanemyr, Amin, Robbles, & Greene, 2020). However, in Nigeria, the challenges of reaching the present generation of youths concerning sexual and reproductive health issues are related to limited knowledge, privacy and confidentiality (WHO, 2016; FMOH, 2019s). Other On-going strategies to promote utilization of YFSRHS, include public media campaigns such as radios, billboards, local skits and television campaigns. In developing countries, mobile phone is seen as a way of surpassing some health system problems, reaching hard- to-reach groups, reducing inequality and increasing access to quality care (Cornelius, et al, 2021). Research have shown that the youths in Nigeria and other developing countries are willing to access sexual and reproductive information

using mobile phones (Delany, Cowan, Busza, Moor, Kelley, & Fairlie, 2019). This may be beneficial to youths in developing countries who are disadvantaged in terms of access to sexual and reproductive information and services.

Use of SMS in the Promotion of YFSRHS

Traditionally, health education and communication interventions for youths have been delivered using school-based programs and mass media like television, radio and billboards. The rapid growth and use of ICT like the mobile phone (SMS) and internet is gradually causing shifts in the preferred method of delivery to effectively reach targeted populations (FMOH, 2019). The use of SMS for sexual and reproductive health revolves around themes which are knowledge and attitude, sexual behavior, use of condom, multiple sex and sexual healthcare seeking behavior (NBS, 2020). Youths view dissemination of SRH information through SMS as a good delivery method for ensuring access to accurate information. Improved knowledge is regarded as the most consistent effect of SMS on sexual and reproductive health of the youth. Mobile Phones (SMS) has the potential of encouraging an individual to think about certain behaviors of interest, supporting them as a part of motivation towards behavior change. This was reported as the reason behind its positive effect on smoking cessation, motivation, adherence and other areas of health promotion.

Benefits of Using SMS

The concept of using mobile apps to link users to services, make orders on-line, and have orders delivered is not new. For example, mobile apps like Jumia for shopping and food deliveries and Uber for car services among others have been existing and have attracted huge demand from the public. Health text messaging is a widely accepted and well-liked means of sexual health communication (Anam, Akber, Adeel, Armieh & Saleem (2021). It is estimated that 37% of Nigeria's population has access to the internet. This serves as a potential solution through the provision of high-quality, non-judgmental and non-stigmatizing YFSRHS. Mobile service applications will increase the demand for uptake of YFSRHS and will be of benefit to the youths because it is cost-effective. Studies by Tolly, Sinner, Nembaware and Benjamin, (2019), Ippoliti & Engle (2020), Svanemyr, Amin, Robbles, and Green, (2020), revealed that text messaging interventions encourages short and long-term behavioral change, and improved outcomes related to smoking cessation, physical activity and obesity This is because many people can access text messages despite having different types of phones. Although, several mobile YFSRH applications exist, most of them lack

sufficient functionality, usability, and effectiveness in terms of long-term and sustainable behavioral change (Ippoliti & Engle, 2020). Text messaging through mobile phones is a widely accepted and well-liked means of sexual health communication (WHO, 2016).

SMS as reminders for hospital appointment and treatment

A major part of the evidence for sexual and reproductive Health comes from the use of text messages as reminders, appointment reminders and treatment adherence support reminders to improve antiretroviral adherence. Hasvold and Wootton (2019) conducted a study on 'Use of Telephone and SMS Reminders to improve attendance at Hospital Appointments: A systematic review' reported a clear improvement in the care attendance rate after sending reminders to clients prior to their appointment. The findings indicated that personal phone calls were slightly more effective than automated reminders but also more time consuming and expensive. The timing of the reminder did not cause difference in poor attendance rate, even if the reminder was sent the day before the appointment or the week before. The researchers opined that since 30 out of the 33 studies were conducted in Western countries, the results cannot be directly applied in hard-to-reach areas. They also suggested that in resource poor settings, questions such as transportation may need more planning. Therefore, the timing of the reminder must be adapted to the local settings. Discussing the improved attendance rate and the savings brought about by the reminders, the authors suggested that all hospitals should consider using automated reminders to reduce poor attendance at appointments.

SMS for treatment support adherence

The central focus of using SMS is to improve utilization of health facility and health status. Self-monitoring has been successfully used for anti-retroviral adherence to HIV/AIDS treatment. Improved adherence to anti-retroviral therapy after SMS intervention has been found with Brazilian youths and in resource limited setting in rural Kenyan (Da Costa, et al, 2019). According to Karnja, Mbuagbaw, Ritvo, Law, Kyobutungi, Reid and Lester, (2019), weekly SMS reminder was more efficient in providing affordable and time-saving solutions. This, the researcher stated, could be explained by Self-Regulation Theories, since weekly SMS can be experienced as being supportive of a person's engagement and self-efficacy, whereas daily SMS as found out by the researchers may discourage the development of internal locus of control. A large quantity of cost-efficient intervention was conducted in a study in the United States for tracing the sexual partners of

individuals diagnosed with sexually transmitted infection. Simple awareness of an impending reminder-call made participants contact their sexual partners and made them to quickly seek health care. This shows the possible behavioral impact of a phone call program, as mere knowledge of being followed by a professional may have positive impacts on health behavior.

SMS for communicating medical results

Mobile phones are used in many projects for communicating medical test results. Receiving medical test results by text messages can facilitate the access to and utilization of YFSRHS. This was demonstrated by Lim, et al, (2019) in a study of a new patient informing system. With the text message application, patients received the test results and treatment faster and the text message result service also significantly saved staff members' time. Mobile devices are feasible in both gathering and disseminating information. They can, in this way reduce administrative work and make work more efficient (ITU, 2020)). Mobile phones can connect lower cadres of health workers to specialist and bring healthcare where there was previously, none. In this way, SMS may improve the effectiveness of rural healthcare providers with improved communication, knowledge sharing and capacity building (Aranda, Mohutsiwa & Svelta, 2020).

Concept of Sexuality Education

Sexuality education, also known as 'sex education,' is the act of teaching and learning that involves an extensive range of areas that are related to sex and sexuality. It is concerned with values and beliefs about the issues that can assist youths to gain the skills that they need in navigating relationships with themselves, their partners, community and being able to manage their own sexual health. Sexuality education is of paramount importance due to the fact that there is great increase in exposure and so much change in lifestyle which has put the youths under a threat of sexual abuse and premature sexual relationships. Sexuality education will help the youths in gaining the information needed to make the best choices or decisions concerning sex and relationships. According to Wadham, Green Debattista, Somerset and Sau (2020) sexuality education is the instruction given in different physiological, psychological and sociological views of sexual responses and reproduction. This goes to inform that sexuality education involves studying the general well-being of individuals and their interactions. Reproductive Health Education is an important component of YFSRHS as it is expected to help the youths in decision-making process regarding several issues about reproductive health. Reproductive education informs the youth about the dangers of pre-marital sexual

activity to be able to avoid such dangers and /or play safe. It can help to protect the female youth from unplanned pregnancy and its related problems, including, but not limited to abortion. Sexuality educational tasks are added to this intervention to help create awareness among youths about YFSRHS. It will help to reduce the incidence of HIV/AIDS. It is important that the youths have knowledge of their physiological development. Sexuality education that the youth get, will help in enhancement of coping mechanism, maintenance of good personal hygiene, prevention of sexually transmitted infections and care of their intimate body parts. These are expected to bring about positive behavioral change of the youth. In a study on 'Sexual and Reproductive Health Service Knowledge and Use among Youth in the Kathmandu Valley, Nepal: Influence of Gender Power Relations' by Wanga, Nuwamanya and Babigumira (2021), most of the participants suggested that a range of programs such as free mobile health and counselling services, along with greater education through mass media/TV/Radio/newspapers, will help to expand YFSRHS and knowledge among youths. One of the major tasks of sexuality education is to inform about lifestyles and behaviors that prevent persons from contracting various illnesses. In this case, sexuality education aims to influence a person's knowledge, attitude and behaviors connected to health in positive way. Sexuality education activities include lectures, courses, seminars, workshops, webinars and classes. The sexuality education was offered to the participants by trained public health nurses and covered a wide range of topics which included relationships, communication, decision-making, body image, gender identity, birth control and sexually transmitted infections (STIs). Hence, sexuality education is added as part of the intervention to further buttress the impact of SMS on YFSRHS. The sexuality education intervention will include reproductive health and reproductive health rights, concept of YFSRHS, types of services offered, adequate nutrition and how to cook good meals, unplanned pregnancy, abortion, STIs and HIV/AIDS, anti-social behaviors- drug abuse and rape, as well as challenge encountered by youths while seeking reproductive health services.

Impact of Sexuality Education on Sexual Behavior

Almost all the theories of youth development accord sexuality a central place in navigating transition from child to adulthood (Martins & Okooboh, 2023). The growing sexual urges that emerge at puberty usually blend with aspects of teenage lives and adaptively channeled. It is important that the youth be able to integrate sexual feelings, needs and desires into a comprehensible and positive sexual identity, which involves sexual self as part of it. Sexual expression allows a unique exposure to relationships. This exposure may lead to positive and

negative outcomes. There is also the possibility of checking one's sense of self-worth and achieving a deeply satisfying intimate relationship. However, when wrong choices are made, there may be destructive outcomes, feeling of anxiety, guilt and sense of unworthiness.

Benefits of Sexuality Education

Sexuality education will contribute to helping youths to delay the age of sexual initiation, increase the usage of contraceptives such as condoms and others when they become sexually active. Sexuality education will also increase youths' awareness and knowledge concerning their body system and relationships, it will also help in decreasing youths' risk-taking behavior and reduction in the frequency of unprotected sex (UNESCO, 2023)

Effects of Sexuality Education on Behavior of Youths

According to National Survey of Family Health (2020), effects of sex education on adolescent intercourse, contraception and pregnancy before the age of 18 years, in the United States, indicated that 68% of youths aged 15-19 years had received formal instruction about pregnancy and contraceptive methods, 16% had heard instruction about pregnancy, while another 16% received neither type of instruction. 46% of youths have had premarital intercourse. Exposure to formal sex education appeared to have no consistent effect on the subsequent probability that a teenager will begin to have intercourse, sex education does influence contraceptive knowledge and behavior. However, sexually active youths who have had formal instruction claim knowing how to use more methods than those who have heard no instruction. The researchers therefore concluded that sex education programs, increased participants' knowledge of human reproduction and methods of reproduction and also some of their attitudes.

Sexuality education improves awareness and knowledge because many youths lack accurate information about sexual and reproductive health. SMS and sexuality education can offer timely, evidence-based information to help youths make informed decisions. Sexuality education supports behavior change theories as many behavioral models such as Health Belief Model or theory of reasoned action (TRA) emphasized knowledge as a main factor in behavior change. Thus, SMS-based sexuality education aligns well with these frameworks.

Theoretical Framework

Theoretical framework connects researcher with existing knowledge on the field. It is an explanation of theories and concepts which describe the research problem and relationship between the variables of the study. Several

theoretical frameworks and models of behavior relating to utilization of health services most frequently used in behavior change were employed to support this work. The employed theories mainly focus on different aspects of how an individual's attitude, belief systems and social relationships impact on his/her engagement with available health services (Andersen 2017). These theories of health services seeking behavior are drawn from social science disciplines such as social psychology, medical anthropology and sociology. In doing so, the most applied behavioral models of health services utilization which include 'Health Belief Model' (HBM), 'Theory of Reasoned Action' (TRA), 'Theory of Planned Behavior' (TPB) and Conceptual Framework of Access to Health care were discussed and applied to the study.

The Health Belief Model (HBM)

The Health Belief Model is applicable to this study. It was initially developed in the 1950s by social psychologists in the United States Public Health Service and has remained one of the best known and most widely used theories in health behavior research. The HBM has mainly been applied to three areas of health behaviors. Firstly, it has been used to understand preventive health behaviors such as health promotion and health-risk behavior, vaccination and contraceptive practices. Secondly, it has been employed in illness related behaviors that include adherence to recommended medical regimes, and thirdly, it has been used in behaviors that include clinical service attendance (Champion and Skinner, 2019). A substantial number of factors influence actions taken in the HBM and these are modifying variables. They include demographic such as age, sex, race, ethnicity and education, Psychosocial such as social class, personality and peers. Structural variables such as knowledge and experience. All these may have effects on all other perceptions which include severity, susceptibility, benefit and barrier to health-related behaviors. HBM suggests that human beliefs concerning health challenges, perceived benefits of action, barriers to action and self-efficacy explain engagement or non-engagement in health promotion behavior. It helps to better understand the failure of people to adopt disease prevention strategies or screening tests for early detection of diseases. HBM tells us that behavior is a function of an individual's socio-demographic characteristics, knowledge and attitudes (Champion, et al, 2019). The HBM suggests that individuals will act for illness prevention under the following circumstances- which are, if they believe that they are susceptible, if the consequences of the situation are severe and if the benefits of action overshadow the costs. At the initial stage, only four constructs of the model were identified, and these are (i) perceived susceptibility, (ii) perceived severity, (iii) perceived

benefits and (iv) perceived barriers. Along the line, there were additional two and these being (v) cues to action and (vi) self-efficacy. The construct of 'perceived susceptibility' refers to an individual's subjective perception of the likelihood of getting a disease or condition. For instance, a youth must believe that there is a possibility of contracting a sexually transmitted infection or becoming pregnant before they will be motivated to patronize YFSRHS facility or use a condom. This construct reflects the fact that there is a wide variation in individuals' concept of personal vulnerability to a particular disease or lifestyle behavior such as sexual risk. The notion of 'perceived severity' explores an individual's beliefs about the seriousness of contracting an illness, or of leaving it untreated. Again, there is wide variation in understanding the concept 'severity', considering an evaluation of both medical and clinical consequences such as pain, disability and death, as well as the possible social consequences of potential effects of the condition on work, family life, and relationships. The combination of 'susceptibility' and 'severity' has been labelled as 'perceived threat'. 'Perceived benefits' refers to an individual's perception of the effectiveness of taking various actions to reduce the threat of illness or to cure illness. The course of action an individual takes in preventing or curing an illness or condition relies on consideration and evaluation of both perceived susceptibility and perceived benefit.

The concept of 'perceived barriers' relates to an individual's perception of the barriers that exist to the successful implementation of a recommended health action such as YFSRHS. Perceived barriers are thus, a potential negative aspect of a particular health action that may impede positive lifestyle. Individuals weigh the effectiveness of the actions against the perceptions that it may not be affordable, have negative side effects, and be in some way unpleasant, time-consuming, or not convenient. 'Cues to action' refer to the stimulus needed to trigger the decision-making process that will help to accept a particular recommended health action. These cues can be internal, examples of which include conditions such as unplanned pregnancy, severe lower abdominal pain and painful urination. Or external, examples of which include factors such as advice from others, illness of a family member or influence of social media. The construct of 'self-efficacy' refers to the level of an individual's confidence in their ability to take actions towards positive changes and having conviction that they can successfully perform a behavior required to produce the outcomes. Self-efficacy is a construct in many behavioral theories that ultimately explains whether a person achieves behavioral change or not. The HBM has mainly been applied to three areas of health behaviors (Champion, et al 2019).

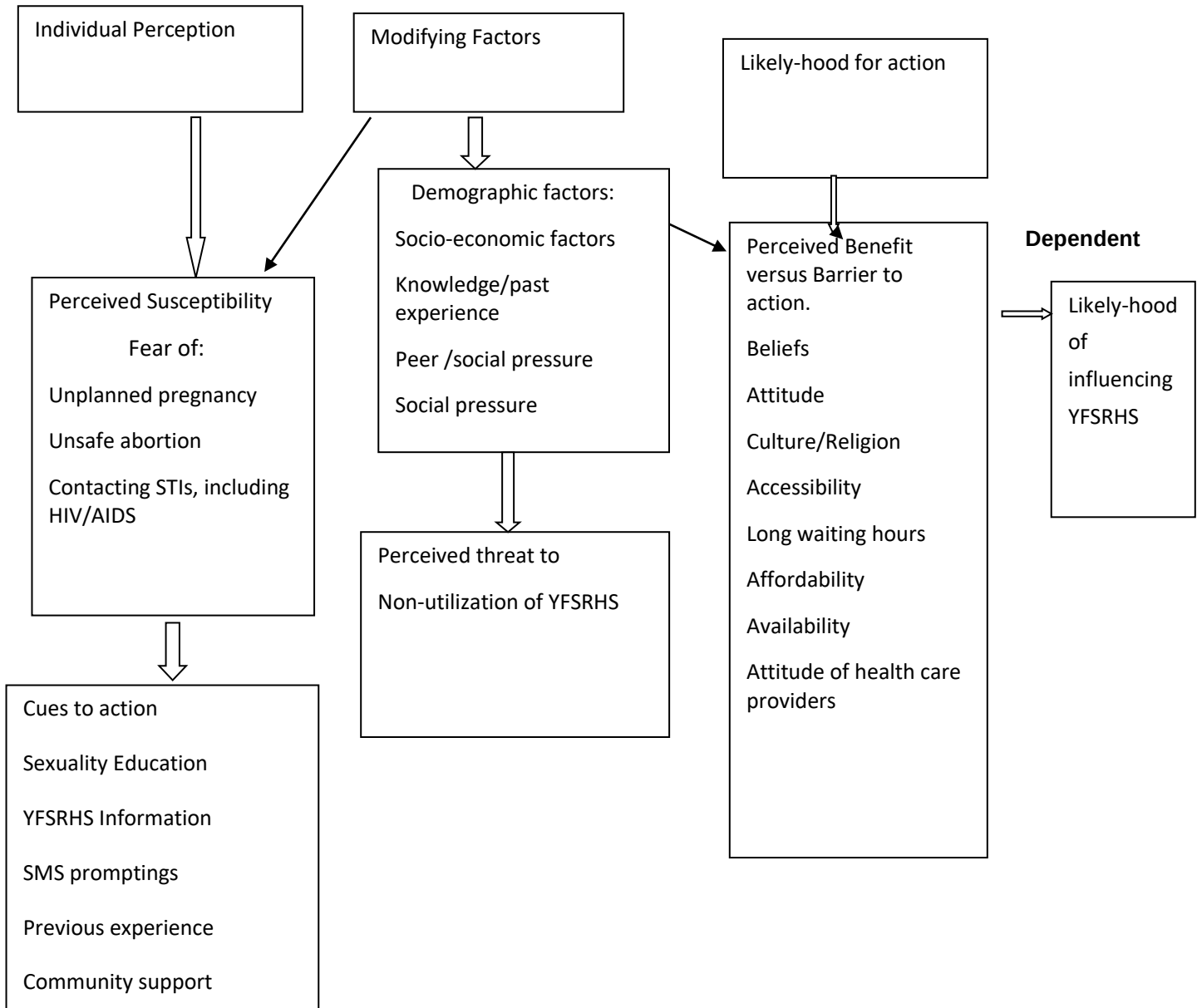


Figure 2.1 Operational framework of the study

Adopted from health belief model component and likages (Mardoche & Dubin, 2024) Operational Framework of the study adapted from Health Belief Model Components and Linkages.

The Theory of Reasoned Action (TRA)

Fishbein and Ajzen (1975), developed the Theory of Reasoned Action to better understand relationships between individual's attitudes, intentions and behaviors. This model predicts both intentions to behave and actual behavior and is useful for identifying 'where' and 'how' to focus strategies such as SMS and sexuality education interventions for behavior change. The TRA suggests that the formation of an individual's behavioral intention is the immediate antecedent of action, and this can influence other variables for behavior change. Three determinants of intention have been identified and these are attitude toward a specific behavior, followed by subjective social norms such as normative beliefs and motivation to comply, and finally, perceived behavioral control. Generally, according to this model, the more positive the attitude and the subjective social norms are towards YFSRHS, the greater the perceived control is, the stronger the individual's intention to use YFSRHS for safer sex or safe sexual activities. If an individual intends to behave in a particular way, it is most likely that the

person will behave in an acceptable way. Behavioral intention measures a person's relative strength of intention to perform a behavior. Attitudes are made up of beliefs about the consequences of carrying out a behavior with the person's valuation of the consequences. Subjective norm is taken as a combination of perceived expectation from relevant persons or social supports with intention to support compliance with expected behavior. That is, the individual's perception that the significant order approves or disapproves the behavior that is being talked about. Simply put, an individual's voluntary behavior is foreseen by the attitude towards that behavior and how he/she feels about other persons' opinion of him, if he carries out such behavior. A person's attitude in combination with subjective norms form the behavioral intention. Attitude in this aspect comprises of beliefs about the implications of accepting/not accepting the uptake of YFSRHS. Subjective norm is the impression that the community members have about him/her and why he/she should not be seen in YFSRHS clinic. The combination of the above reasons will lead to the adoption of a favorable or unfavorable attitude to utilization of YFSRHS. Having these in mind, the theory of reasoned action was used to analyze the attitude of youths towards YFSRHS

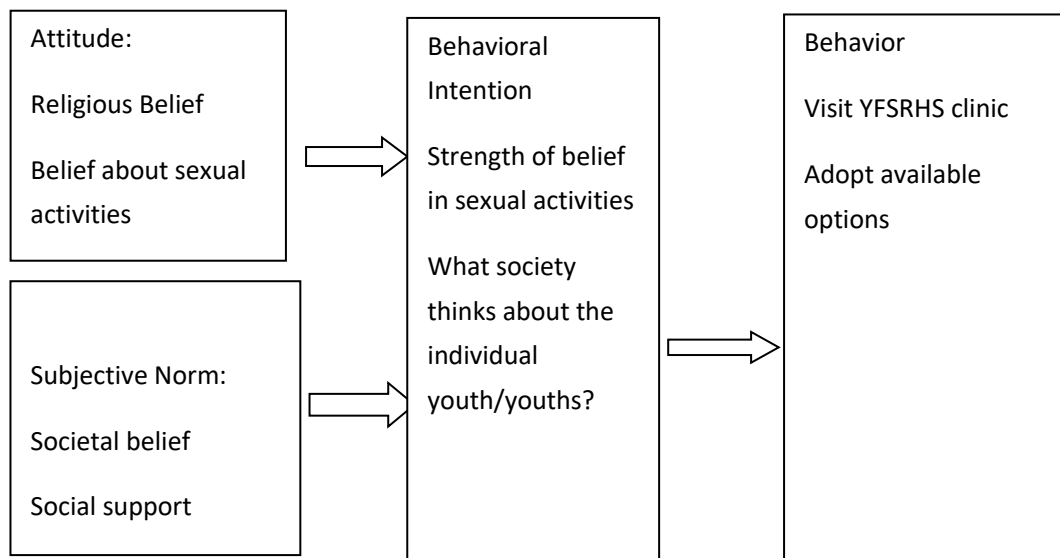


Figure 2.2 Theory of Reasoned action (Fishbein & Ajzen, 1975)

Conceptual Framework of Access to Healthcare

Accessing Healthcare within the proximity of the youths is a very important factor in utilization of YFSRHS. Improved access to YFSRH services and information is essential for supporting youths in making informed decisions and heightening each youth's outcomes related to his/her SRH and well-being, as well as nations' present

and future social and economic development. SMS and health education will offer opportunities to privately access YFSRHS content and to be linked to the services. Conceptual framework of access to health care is adopted as it provides a framework for understanding challenges and barriers at various steps of accessing

health care from both supply and demand point of view. First, the conceptual framework of access to health care will help in understanding the perspective from both the providers and receivers' point of view. It defined access to health care as the opportunity to fulfill the health care needs of individual which starts from identifying the health needs to seeking it, reaching it and finally using it. It further explained that the entire process is affected by both supply and demand parts of health care which is crucial for recognizing the barriers and challenges in accessing health care services. The supply aspect includes health policies, healthcare institutions, health system and healthcare providers, while, the demand aspect include the characteristics of individual personality, family as well as social and physical environments of the youths including tradition and culture. The conceptual framework of access to healthcare as shown in the figure below, presents five (5) propositions from the perspective of both supply and demand. These propositions interact with each other to create access to health care. The first step illustrates that approachability of supply and the ability of the individual to perceive the health care needs will determine the perception and desire regarding health care needs of a community.

Access to healthcare is a multidimensional and interconnected process influenced by five key components: approachability, acceptability, availability, affordability, and appropriateness of health services. Approachability focuses on making health services visible and known to the community through transparency, awareness, and adequate information, while individuals'

ability to recognize health needs depends on their knowledge, literacy, and beliefs. Acceptability reflects the extent to which health services align with societal norms, cultural values, gender sensitivity, and professional ethics, alongside individual and social factors that shape health-seeking behavior.

Availability and accommodation relate to the physical presence of services, including geographic location, operating hours, infrastructure, staffing, and service delivery mechanisms, all of which influence individuals' ability to reach healthcare. Affordability addresses the financial, time, and transportation costs associated with accessing care, with poverty and social isolation acting as major barriers. Appropriateness emphasizes the provision of adequate, need-based, and high-quality services, including technical competence, interpersonal care, and user involvement in decision-making, which collectively enhance satisfaction and health outcomes.

These five dimensions operate sequentially and interactively with individuals' abilities to perceive, seek, reach, pay for, and engage in healthcare. Improvements at one stage positively influence subsequent stages, highlighting that access to healthcare extends beyond service availability alone. Therefore, addressing individual, social, and community-level factors is essential for improving access to youth-friendly sexual and reproductive health services (YFSRHS). To bridge identified gaps, programmatic strategies such as targeted health education and SMS-based mobile interventions are recommended to enhance awareness, demand, and effective utilization of services.

Conceptual Framework of Access to Healthcare

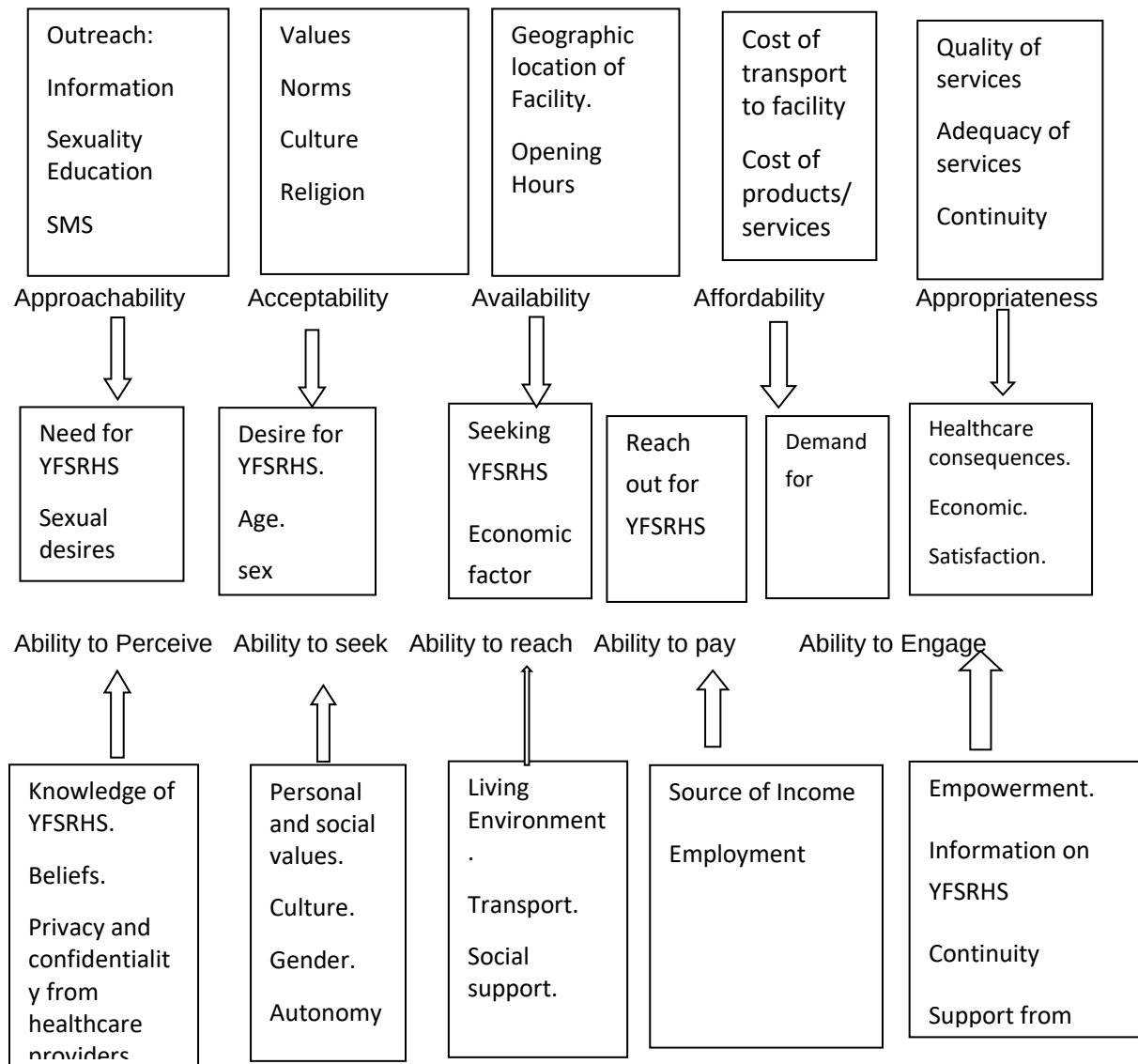


Figure 2.3: Conceptual framework of access to healthcare

Empirical Review

The empirical review examined studies on youth-friendly sexual and reproductive health services (YFSRHS), SMS-augmented sexuality education interventions, and related behavioral models to address the study objectives and identify research gaps. Evidence consistently shows that SMS-based interventions improve youths' sexual and reproductive health knowledge, awareness, and attitudes, and in some cases increase service utilization. Randomized controlled trials and systematic reviews

across different settings reported that SMS reminders and educational messages enhanced health-seeking behaviors such as clinic attendance, vaccine uptake, STI testing, and contraceptive demand. Interventions that combined reminders with educational content or interactive components were more effective than simple reminders alone. However, improvements in knowledge and attitudes did not always translate into sustained

behavioral change, highlighting the influence of contextual and social factors.

Studies conducted in Nigeria and other low- and middle-income countries demonstrated that SMS-based sexuality education significantly improved youths' knowledge and attitudes, though evidence of reduced risky sexual behavior and increased utilization of YFSRHS remained mixed. Findings from Africa, Asia, Australia, and the United States further revealed that the effectiveness of SMS interventions depends on message content, timing, cultural context, and existing structural barriers such as transportation, cost, and social norms.

Empirical evidence on youths' attitudes toward YFSRHS indicates that although many youths have adequate knowledge and positive perceptions of the services, actual utilization remains low. Barriers commonly reported include limited availability of YFSRHS, inconvenient service hours, high cost, lack of privacy and confidentiality, long waiting times, and poor awareness of service locations. Several studies confirmed a persistent gap between knowledge and practice, with many sexually active youths perceiving themselves as not vulnerable to sexual and reproductive health risks despite engaging in unsafe behaviors.

Experiences of youths with YFSRHS further revealed that judgmental and unsupportive attitudes of healthcare providers, social stigma, and cultural and religious norms significantly discourage service utilization, particularly in government-owned facilities. Conversely, healthcare providers often attributed low utilization to youths' poor awareness, restrictive policies related to age and marital status, and cultural taboos surrounding sexual health discussions. This divergence in perspectives underscores the need for youth-centered service delivery and provider training.

Overall, the empirical evidence highlights that improving access to and utilization of YFSRHS requires more than service availability alone. Integrated interventions that combine youth-friendly service provision, supportive provider attitudes, community engagement, and innovative strategies such as SMS-based health education are essential. The review also reveals a clear gap in context-specific studies evaluating the direct impact of SMS-augmented sexuality education on YFSRHS utilization among youths, thereby justifying the need for the present study.

Literature Synthesis and Knowledge Gap

The literature reviewed highlighted several global and national initiatives aimed at improving the quality and utilization of youth-friendly sexual and reproductive health

services (YFSRHS), including the growing use of SMS-based health interventions. Although these strategies have demonstrated potential in improving knowledge and attitudes, significant gaps remain in their integration with routine YFSRHS delivery, particularly in Nigeria. Most existing studies failed to combine digital interventions with in-service YFSRHS using a coordinated, youth-centered approach that bridges mobile communication with facility-based care.

There is limited evidence in Nigeria on the implementation, monitoring, and evaluation of interventions designed to improve youths' sexual and reproductive health, with few rigorously evaluated programs available. Existing studies largely describe the prevalence and patterns of risky sexual behaviors among youths but provide insufficient explanations for the underlying reasons influencing these behaviors and service-utilization decisions. Socio-economic challenges, urban migration, weak social support systems, cultural taboos, sexual violence, and restrictive norms further complicate access to sexual and reproductive health information and services.

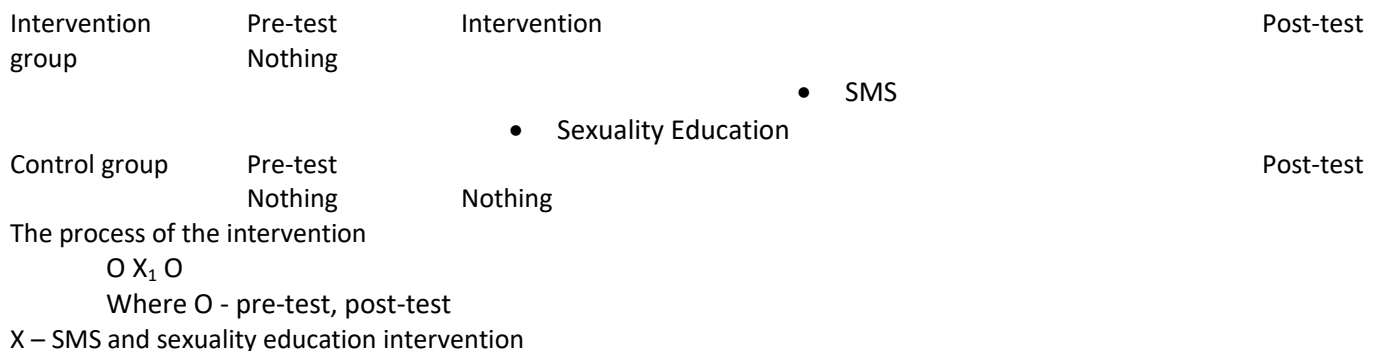
The literature also revealed inadequate data on youths' health-seeking behaviors, awareness, accessibility, and actual utilization of YFSRHS, as well as a persistent gap between knowledge of services and their use. Progress toward national YFSRHS policy goals, especially behavior change outcomes related to HIV/AIDS, unplanned pregnancies, and unsafe abortion, remains poorly assessed due to limited longitudinal evidence.

Overall, these gaps underscore the need for context-specific, integrated interventions that combine health education with SMS-augmented strategies to improve awareness, accessibility, and utilization of YFSRHS. This study was therefore designed to address these gaps by evaluating the effect of an SMS-augmented sexuality education intervention on youths' utilization of YFSRHS in Edo State.

Methodology

This study adopted a mixed-methods design to comprehensively examine the effects of SMS-augmented sexuality education on youths' utilization of youth-friendly sexual and reproductive health services (YFSRHS) in Benin City, Nigeria. The mixed-method approach integrated quantitative and qualitative components to enable both outcome measurement and in-depth exploration of contextual factors influencing the intervention.

The study was conducted in two phases. Phase 1 involved a needs assessment using a descriptive cross-sectional survey and qualitative interviews. Quantitative data were collected from youths aged 15–24 years in Oredo and Ugbekun communities through a structured questionnaire administered using multistage sampling. The questionnaire assessed socio-demographic characteristics, awareness, knowledge, attitudes, and utilization of YFSRHS. Descriptive statistics were used to analyze demographic data, while Chi-square tests were employed to examine differences in awareness, knowledge, and utilization of services. Qualitative data were obtained through interviews with community health nurses and community members to explore perceptions, experiences, and gaps in YFSRHS, which informed the development of the SMS-augmented sexuality education intervention.



The independent variables in this study were SMS-augmented sexuality education and sexuality education, which were designed to address factors influencing youths' access to youth-friendly sexual and reproductive health services (YFSRHS). These factors included socio-demographic characteristics such as age, sex, educational status, culture, religion, socio-economic status, and awareness of YFSRHS. Other assessed variables were health facility organization, service delivery, providers' attitudes, and availability of services.

The dependent variable was youths' access to YFSRHS, measured through levels of awareness, knowledge, attitudes, and demand for key services, including family planning, HIV testing and counselling, and management of sexually transmitted infections.

Phase 2 employed a quasi-experimental design with non-equivalent intervention and control groups using a pre-test and post-test structure. The two communities were randomly assigned to intervention (Oredo) and control (Ugbekun) groups. A total of 152 youths participated in the quasi-experiment, with 76 youths in each group, determined using Yamane's formula. The intervention group received SMS-based sexuality education over a six-week period, while the control group received no intervention. Pre- and post-tests were conducted to assess changes in utilization of YFSRHS and related outcomes. Comparative analyses between and within groups were performed using Chi-square tests to determine the effect of the intervention.

The study was conducted in two purposively selected communities Oredo and Ugbekun located within Benin City, Edo State, Nigeria. These communities were selected because their primary healthcare centers met World Health Organization standards for implementing YFSRHS. Although supported by organizations such as the Danjuma Foundation and Action Health Incorporated, utilization of the services remained low. The communities are ethnically diverse, predominantly inhabited by the Bini people, and residents are mainly civil servants, factory workers, farmers, and small-scale business owners.

The target population comprised youths aged 15–24 years residing in the two communities. Ikpoba-Okha Local Government Area, which includes Ugbekun community, had an estimated youth population of 7,880, while Oredo Local Government Area had an estimated

youth population of 7,931. The combined youth population of both communities was 15,811, which formed the basis for determining the study sample size.

The selected communities were located in Ward 7 (Ugbekun) and Ward 1 (Oredo), respectively.

Table 3.1: Edo State-Population Statistics based on projections (Population 03/11/2021)

LGA	Total population	Population of youths in the LGA = 19.4%	Number of youths in the community
Oredo	490,600	95,176 /12 political wards	$7,931 \times 100 = 793,100 / 15811 = 50.2\%$ (approx;)
Ikpoba-Okha	487,400	7880 / 12 political wards	$7,880 \times 100 = 788000 / 18811 = 49.8\%$ (approx;)
Total	978,000		15811

Population projection assumes the same rate of growth for all LGAs within a state. Source: National Population Commission

www.citypopulation.de assessed 03/ 11/2021

Table 3.1 presents the projected population statistics of Edo State as of November 3, 2021, focusing on youth populations in Oredo and Ikpoba-Okha Local Government Areas (LGAs). The combined population of both LGAs was estimated at 978,000, with youths aged 15–24 years constituting 19.4% of the population. Oredo LGA had an estimated total population of 490,600, with approximately 95,176 youths, while Ikpoba-Okha LGA had a population of 487,400, including about 94,556 youths. Based on equal distribution across twelve political wards, the youth population in Oredo and Ugbekun communities was estimated at 7,931 (50.2%) and 7,880

(49.8%), respectively, giving a combined youth population of 15,811. These figures formed the basis for determining the study sample size.

To minimize contamination between the intervention and control groups, several measures were implemented, including geographical separation of the communities (approximately 16 km apart), secure storage of intervention materials, close monitoring of a reduced quasi-experimental sample, and delayed provision of intervention materials to the control group after study completion.

Table 3.2: Proportionate sampling Technique

LGA	Population of Youth	Percentage of population	Number of sampled youths
Ugbekun	7,880	49.8	$49.8 / 100 \times 15811 = 212$
Oredo	7,931	50.2	$50.2 / 100 \times 15811 = 214$
Total number of youths	15,811	100	426

Table 3.2 presents the sample size for the needs assessment was determined using Taro Yamane's formula for finite populations, resulting in a minimum sample of 386 youths. After adjusting for a 10% attrition rate, a final sample size of 426 youths was used. Proportionate sampling allocated 214 youths (50.2%) to Oredo and 212 youths (49.8%) to Ugbekun.

For the quantitative strand, simple random sampling was employed to recruit youths aged 15–24 years, enhancing representativeness and reducing bias. The qualitative strand used purposive and convenience sampling to select information-rich community members and health workers. For the quasi-experimental phase, 152 youths were selected from the needs-assessment sample to ensure feasibility, continuity, and controlled baseline characteristics, thereby strengthening attribution of observed outcomes to the SMS-augmented sexuality education intervention.

Ethical approval and permissions were obtained from relevant local government authorities, health facilities, community leaders, parents, and youths before the study commenced. All 426 youths who participated in the needs assessment provided informed consent and were aware of possible re-contact for subsequent study phases. Participation was voluntary, with assurances of confidentiality, anonymity, privacy, and the right to withdraw at any time without consequences. For

participants under 18 years, parental consent and youth assent were obtained. No physical harm was involved; the only identified risk was time spent participating.

A two-stage sampling approach was adopted. The needs assessment involved 426 youths selected through multistage and systematic sampling from Oredo and Ugbekun communities. For the quasi-experimental phase, a reduced sample of 152 youths (76 per community) was determined using Yamane's formula with a 7% margin of error and a 10% attrition adjustment, allowing close monitoring during the six-week intervention.

Data were collected using validated structured questionnaires and interview guides. Instrument validity was ensured through expert review, pilot testing, and cultural adaptation, while reliability was confirmed using Cronbach's alpha (0.7). Trustworthiness of qualitative data was established through credibility, dependability, confirmability, and transferability measures.

The intervention comprised culturally tailored SMS messaging and sexuality education delivered to the intervention group only. Data collection followed pre-test and post-test procedures. Research assistants were trained on ethics, confidentiality, and standardized data collection methods. Overall, the study adhered strictly to ethical principles of respect, beneficence, transparency, and scientific integrity.

Table 3.3: Sexuality Education Package

SEXUALITY EDUCATION PACKAGE						
Title	Timeline	Content	Learning Objective	Activities of Learners	Expected Outcome/ Feedback based on SMART	
Module 1	Week 1	- General overview of YFSRHS - Meaning of reproductive health - Reproductive health right of the youth - Review of male and female reproductive systems, including puberty and menstruation, fertility/fertile period of female youths. Building healthy and respective relationships, consent and bodily autonomy, importance of consent and respecting personal boundaries,	At the end of these lectures, youths will recall the meaning of reproductive health and rights of the youth, which include the right to equality, right to life and be free from harm, right to privacy and personal autonomy and right to healthcare.	Charts were used for the discussions. These were tools to facilitate teaching and learning during sexuality education session. Open-ended questions on topics discussed were thrown to the youths and were asked to give their best answers	At the end of this course, youths recalled the meaning of reproductive health and rights of the youth. Youths recalled signs of fertile periods such as changes in basal body temperature, breast tenderness, changes in cervical mucus, ovulation pain / cramps.	
Module 2	Weeks 2 & 3	- Concepts of YFSRHS - Types of services offered - Family planning methods -including advantages and disadvantages, Communication-encouraging open discussion about sexuality and sexual health.	At the end of this discussions, youths will verbalize the distinct challenges faced by them and aim to create an environment where they feel comfortable seeking care	Youths demonstrated understanding of the different types of services offered at the clinic and brainstorming on the services they love most and why.	Youths demonstrated the types of services offered at youth-friendly sexual and reproductive health services offered at clinic. Using a short drama piece for each service type.	

SEXUALITY EDUCATION PACKAGE						
Title	Timeline	Content	Learning Objective	Activities of Learners	Expected Outcome/ Feedback based on SMART	
Module 3	Weeks 4, 5 and 6	- STIs, HIV/AIDS transmission - Drug Abuse - Rape - Unplanned pregnancy - Unsafe/complicated Abortions - Violence - Decision-making, helping youths to make informed choices about their sexual health, Critical thinking-analyzing media messages and societal norms about sexuality.	At the end of these lectures, youths will verbalize how to protect themselves from contacting STIs, and unplanned pregnancy and all other social vices	The youths were taught using teaching aids such as the picture of a drunkard with personality change. One who contracted HIV through unprotected sexual intercourse.	Youths verbalized that if one must engage in sexual activity, it is better to use a protective sexual device such as the male condom.	

Teaching and learning during sexuality education sessions were supported with visual and practical aids such as charts, posters, models, condom samples, and images highlighting the consequences of drug abuse. Lecture and discussion methods were used. Youth-friendly clinics operated weekdays with trained nurses, and four research assistants were trained to facilitate education, counseling, and data collection.

Home visits were conducted in two phases: the first involved needs assessment and community engagement to identify cultural and contextual factors affecting YFSRHS utilization, while the second involved recruitment, pre-testing, and scheduling of intervention activities. Pre-test and post-test questionnaires assessed

awareness, knowledge, attitudes, and utilization of YFSRHS.

The intervention consisted of six structured sexuality education modules delivered weekly, combined with SMS messaging for the intervention group. Sessions included reviews, discussions, assignments, and question-and-answer periods. Post-tests were conducted after the intervention, and clinic attendance data were collected to assess service utilization. Control participants received educational materials after the study.

Quantitative data were analyzed using descriptive statistics and Chi-square tests in SPSS to compare pre- and post-test outcomes and associations between variables. Qualitative interview data were thematically analyzed. Overall, the intervention improved awareness,

knowledge, and utilization of YFSRHS, though challenges such as sustainability and long-term behavioral impact were noted.

Quantitative findings showed that all participants were within the target age range of 15–24 years, with a balanced gender distribution (50% males and 50% females in both communities). A higher proportion of youths were aged 15–19 years, particularly in Oredo, while Ugbekun had relatively more youths aged 20–24 years.

- Most participants had at least secondary education, which was the highest qualification for about half of the youths in both communities. Tertiary education was more common in Ugbekun than Oredo, while a small proportion in both communities had no formal education. The majority of youths were students, followed by those who were unemployed, civil servants, or self-employed.
- Religion-wise, Christianity was predominant in both communities, especially in Oredo, while Ugbekun had a more diverse religious composition, including Muslims and traditional worshippers. Most youths came from monogamous families, though polygamous family backgrounds were more common in Ugbekun than in Oredo.
- Regarding living arrangements, fewer than half of the youths lived with both parents. A notable

proportion lived with a single parent, alone, or with others, particularly in Ugbekun. Parental education levels were generally high, with about half of fathers and mothers in both communities having tertiary education, although some parents had only primary or no formal education.

- Overall, the demographic characteristics of youths in Oredo and Ugbekun were broadly similar, indicating comparability between the two communities and providing a suitable baseline for subsequent intervention analysis.

The study summarizes the research findings, synthesized needs assessment with quasi-experimental design, and discusses the limitations and recommendations of the study.

Discussion of Findings.

The study was conducted to assess the effects of SMS-Augmented Sexuality Education interventions on YFSRHS and to determine if there were differences in the results obtained before and after interventions. The dependent variables which were the determining factors that caused the change were SMS and Sexuality Education while awareness, knowledge, attitude towards the services were the independent variables, this in turn improved the outcome which is the extent to which the participants demanded for the services after the intervention. And whether there were other factors responsible for the differences. This chapter helped in clarifying the findings of this study and compared the study with previous related studies.

Table 5.1 Logical Flow from Needs Assessment to Quasi-Experimental Intervention Outcomes

Phase	Findings	Implication
Needs Assessment	Poor awareness of YFSRHS, No prior knowledge and low utilization	Identification of main gaps and justification of the need for an intervention directed to sexual and reproductive health needs
Intervention Design	Development of a six-week SMS-augmented sexuality education program awareness, knowledge and utilization of YFSRHS	Content focused on raising awareness, correcting misconceptions and encouraging utilization of YFSRHS
Implementation	SMS messages and sexuality education were delivered to the intervention group over a 6- weeks	Provided consistent accessible and YFSRHS information through SMS

Post-test/ Evaluation	Moderate increase in utilization in intervention group and slight increase in control group	SMS intervention was effective. While the slight increase in control group was attributed to sensitization during needs assessment.
Conclusion	Needs assessment played a critical role in shaping and informing intervention content	Demonstrated value of needs assessment in designing effective context specific YFSRHS interventions.

The study demonstrated that conducting a needs assessment was essential for designing an effective SMS-augmented sexuality education intervention. Baseline findings revealed poor awareness, limited knowledge, misconceptions, and low utilization of YFSRHS among youths, which informed a targeted 6-week intervention. Post-intervention results showed a moderate improvement in YFSRHS utilization among the intervention group, confirming the effectiveness of structured SMS reminders and sexuality education, while slight improvements in the control group were attributed to sensitization effects. The intervention improved access to health information, youth engagement, privacy, reduced stigma, and service utilization in a cost-effective manner. Guided by health behavior theories (HBM, Theory of Reasoned Action, and health service utilization models), the findings highlight the critical role of nurses in integrating SMS-based strategies into routine YFSRHS to improve youths' health outcomes. Overall, the study contributes empirical evidence supporting SMS-augmented interventions as scalable, theory-based, and effective approaches for enhancing YFSRHS utilization in low-resource settings.

References

- Abebe, M & Awoke, W (2020), Utilization of Youth-Friendly Services and Associated Factors among high school students in Bahir, Dar, Amhara regional state, Ethiopia, *Open J Epidemiol*; 4(4); 69-75.
- Action Health Incorporated. (2020). Youth sexual and reproductive health in Nigeria: Policy and practice. AHI.
- Adebayo, A. M., Adeoye, I. A., & Ogunyemi, A. O. (2023). Factors affecting utilization of youth-friendly sexual and reproductive health services in Lagos State, Nigeria. *African Journal of Reproductive Health*, 27(2), 45–56.
- Adebayo, F Toriola, E Kuyinu, Y Adeyemo, A & Goodman, O (2023), Factors affecting Utilization of youth-friendly sexual and reproductive health in Lagos State, Nigeria. *Int adolesc Med Health* (2023) 31-20190159.doi. 10.1515/Ijmh 2023-0159.
- Adione, Abamara, N & Vivalya, B (2023), Determinants of the utilization of youth-friendly sexual and reproductive health services in public secondary schools of Kogi State, Nigeria: an explorative study. *BMC, Public Health*, 23, 1091
- African Youth Alliance (AYA) & Pathfinder International (2020), Integrating Youth-friendly sexual and reproductive health services into public health: An assessment of facilities.
- AHI (2023), Expanding Youth's Access to Youth Friendly Sexual and Reproductive Health Services in Lagos State, Nigeria. *Repro'd; Health Afri. J reproductive health*. 18(2); 211-28.
- Ajayi, A Otukpa, E Nwaka, M Kabiru, C & Ushie, B (2021), Adolescent sexual and reproductive health research in Sub-Saharan Africa: a scoping review of substantive focus research. *Geographic distribution and African-led inquiry. BM Global health* (2021).6-004129-doi.10.1136. bmjgh 2021-004129.
- Akande, O Muzigaba M Igunbor, U Elimian, K Bolarinwa, A Musa, O & Akande, T (2024), The effectiveness of an mHealth intervention on sexual and reproductive health services of in-school youths: a cluster randomized controlled trial in Nigeria.
- Akande, O. O., Akinwale, O. P., & Salami, K. K. (2024). Mobile health interventions and adolescent sexual and reproductive health outcomes in sub-Saharan Africa: A systematic review. *BMC Public Health*, 24, 118. <https://doi.org/10.1186/s12889-024-0118-3>
- Anam, S Akber, A Adeel, K Armieh & Saleem, S (2021), Using mobile phones to improve young people's sexual and reproductive health in low and middle-income countries: A systematic review to identify barriers and facilitate range of mHealth solutions. Doi:<https://doi.org/10/1186/s1293708-01059-7>

- Andreatta, P Delbpuur, M & Danquah A (2020). Using cell phones to collect postpartum hemorrhage outcome data in rural Ghana. *International journal of gynecology and obstetrics: the official organ of the International Federation of Gynecology and Obstetrics*, 113(2); 148–151.
- Aranda J, Mohutsiwa N & Svelta L (2020). Systematic review on what works, what does not work and why of implementation of mobile health (mHealth) projects in Africa. *BMC Public Health*. 2019; 14:188. doi:[10.1186/1471-2458-14-188](https://doi.org/10.1186/1471-2458-14-188). cited 2020, Nov 2.
- Brindis, C. D., & Decker, M. J. (2020). Assessment of youth-friendly sexual and reproductive health services: A systematic review. *Journal of Adolescent Health*, 67*(3), 312–322. [<https://doi.org/10.1016/j.jadohealth.2020.04.015>] (<https://doi.org/10.1016/j.jadohealth.2020.04.015>)
- Center for Disease Control (CDC) (2020), National operational plan for scaling-up HIV prevention. *John Hopkins University and Family Health International*.
- Cicely, M., Renedo, A., Nyaaba, G. N., Kazuyo, K., & Tapsoba, P. (2022). Sexual and reproductive health rights in low- and middle-income countries: Progress and challenges. *Global Public Health*, 17(6),912–925. [<https://doi.org/10.1080/17441692.2021.1900314>] (<https://doi.org/10.1080/17441692.2021.1900314>)
- Cornelius B, Lawrence S, Howard C, Shah D, Poka A, McDonald D (2021), Receptivity of African American Adolescents to an HIV: Prevention Curriculum Enhanced by Text Messaging. *Journal for Specialists in Pediatric Nursing*. 14(2); 123–131.
- Currie, G McLeod, C & Snelling, T (2024), SMS-based interventions for improving child and adolescent vaccine coverage and timeliness: a systematic review. *BMC Public Health* 24, 1753. <https://doi.org/10.1186/s12889-024-18900-4>
- Dehne, K. L., & Riedner, G. (2019). Sexually transmitted infections among adolescents: The need for adequate health services. *Bulletin of the World Health Organization*, 97(4), 234–241. <https://doi.org/10.2471/BLT.18.215111>
- Elemile, O. O., Ojo, T. O., & Ogunmuyiwa, T. A. (2023). Unmet contraceptive needs and unsafe abortion among Nigerian youths. *African Population Studies*, 37(1), 5801–5814.
- Engle L, Mangone R & Parcesepe M (2019). Mobile Phone Interventions for Adolescent Sexual and Reproductive Health: A Systematic Review. *Pediatrics*. 2019; 138(3): e 20160884.
- Engle, L vandat, LNdakidemi, E Lasway, C& Zan, T (2019), Evaluating feasibility reach and potential impact of a text message family planning information service in Tanzania *Contraception*. 1(87); 251-6. Doi.10.1019/j.contraception.07009
- Erulka, S, Onoka, J & Phiri (2018), What is youth-friendly? Adolescents' preferences for reproductive health services in Kenya and Zimbabwe. *African Journal of reproductive Health. Women's health and Action Research Center*, population council, Accra.
- Esiet, A (2018), Adolescent sexual and reproductive health in Nigeria: Promoting youth health and development *Action Research Incorporated*. <https://www.wilsoncentre.org/sites/default/files/esiet%20presentation>.
- Esiet, U. (2020). Adolescents' access to sexual and reproductive health services in Nigeria. *International Journal of Adolescent Medicine and Health*, 32(5), 1–8. <https://doi.org/10.1515/ijamh-2018-0142>
- Family Planning Association of Kenya. (2020). Youth-friendly reproductive health services: Best practices and lessons learned. FPAK..
- Federal Ministry of Health. (2020). Nigeria HIV/AIDS indicator and impact survey (NAIIS). FMOH.
- Federal Republic of Nigeria (FRN) (2020), National Youth Policy: Percentage of Youths in Nigeria www.prb.org/uploads.
- Finlay, E Canning, D & June, P (2020), Reproductive Health Laws around the world. <https://www.hsph.harvard.edu/pgda/working.htm>
- FMOH: Federal Ministry of Health (2020), "National Guidelines on Promoting Access of Young People to Adolescent and Youth-Friendly Services in Primary Healthcare Facilities in Nigeria". *ASRH and school health*. 1(1);31-5.
- Glassier, A., Gulmezoglu, A. M., Garba, M., Van Look, P., & Looke, E. (2021). Sexual and reproductive health: A matter of life and death. *The Lancet*, 397*(10271),144–157. [[https://doi.org/10.1016/S0140-6736\(21\)00001-5](https://doi.org/10.1016/S0140-6736(21)00001-5)]([https://doi.org/10.1016/S0140-6736\(21\)00001-5](https://doi.org/10.1016/S0140-6736(21)00001-5))
- Global Info (2020), HIV/AIDS in Sub-Saharan Africa. www.afro.who.int/health.
- Godia, P. M. (2019). Barriers to utilization of adolescent reproductive health services in sub-Saharan Africa. *Reproductive Health*, 16, 129. <https://doi.org/10.1186/s12978-019-0791-2>
- Hindin, J & Fatusi, O (2019), Adolescent Sexual and Reproductive Health in Developing countries: an

- overview of trends and interventions. *International perspectives on sexual and reproductive health*. 35(2);58-62.
- Hindin, M. J., & Fatusi, A. O. (2020). Adolescent sexual and reproductive health in developing countries: An overview. *International Perspectives on Sexual and Reproductive Health*, 36*(2), 58–62.
- Ihesie, A & Ogochukwu, O (2019), Integrating mHealth into adolescent sexual and reproductive health promotion in Nigeria: prospects and barriers. *Int J Community Med. Public Health*. 4(39); 31-41.
- International Planned Parenthood Federation (IPPF) (2020), Sexual and reproductive health and rights – key to gender equality and women's empowerment. http://www.ippf.org/sites/default/files/2020_gender_equality_report_web.pdf
- International Telecommunication Union. (2021). Measuring digital development: Facts and figures 2021. ITU.
- Ippoliti, N. & Engle, K (2020). Meet us on the phone: mobile phone programs for adolescent sexual and reproductive health in low-to-middle income countries. *Reprod Health* 14, doi: 10.1186/s12978-016-0276
- Kay, M., Santos, J., & Takane, M. (2020). mHealth: New horizons for health through mobile technologies. World Health Organization Global Observatory for eHealth Series, 3, 1–112.
- Kirby, D Raine, T, Thrush, G Yuen, C Sokoloff, A & Potter, C (2020), Impact of an intervention to improve contraceptive use through follow-up phone calls to female adolescent clinic patients. *Perspective on sexual and reproductive health*. 42(4);251-257.
- Kudolo, P Kovi, E & Rahman L (2019), Adolescent Health project: A baseline survey on adolescent sexual and reproductive health in the operational area of ten ACDEP-member primary healthcare program in Northern and upper East region Health unit of the association of church-based development. NGO (ACDEP), Cardid
- Marie Stopes International (MSI) (2020), vouchers in Ethiopia Using mobile phones to increase young people's access to contraception. One World. Bilayaraje Morocco. *Center for Health Market Innovations. MSI Papua New Guinea*.
- Martins, O & Okooboh, G (2023), Asystematic Review of the evidence on the effectivenessof sexuality education intervention on young people sexual and reproductive health outcomes in Nigeria. Doi: https://doi.org/10.18203/2394_6040.jjcmph.20234150
- Monisola, A & Oludare, A (2019), Adolescent sexuality and sexuality education in south-western Nigeria: Combining questionnaire and participatory methodologies. *The Soc; sci*. 4(4);264-268.
- NACA: National AIDS Coordinating Agency (2020), National HIV strategy for adolescents and young people. NACA Nigeria. <https://naca.gov.ng/national-hiv-strategy-adolescents-young-people>. Assessed 23 Nov 2018
- Ninsiima, L Chiumia, I & Ndeji, L (2021), Factors influencing access to and utilization of youth-friendly sexual and reproductive health services in sub-Saharan Africa: a systematic review. *Reprod Health* 18, 135 (2021). <https://doi.org/10.1186/s12978-021-01183-y>
- Nurmi J. (2021), Sexual and reproductive mHealth in: better access to health care through mobile phones. *Geneva Foundation for Medical Education and Research*. 4(4);31-32.
- Oboro, O & Tabowei T (2020), AIDS prevention programs and sexual behavior among secondary school adolescents in Delta state, Nigeria. *Trop J Obstet/ Gynae* 2 (20); 118-123.
- Okonta, P. I. (2019). Adolescent sexual and reproductive health in the Niger Delta region of Nigeria: Issues and challenges. *African Journal of Reproductive Health*, 23(2), 45–54.
- Okpani, A & Okpani J (2020), Sexual Activity and Contraceptive Use among female Adolescents – A report from Port-Harcourt, Nigeria. *Afri J Reprod Health*. 4(1);40-47.
- Okpani, A. O., & Okpani, J. U. (2020). Utilization of youth-friendly sexual and reproductive health services in Nigeria. *Nigerian Journal of Clinical Practice*, 23(9), 1220–1227.
- Olu, A Ukpe, I & Okuzu, O (2021), Learaging mobile phone health application to improve sexual and reproductive services in Nigeria implication for practices and policies, <https://doi.org/10.1186/312978-021-01969-z>
- Pedrana, E Pina, J Padnaworti, S Zuntina, R Lazuard, I Lim, S Hellard, E & Prabandari, Y (2020), A Quasi-Experimental Text Messaging trial to improve Adolescents' Sexual and Reproductive Health and Smoking Knowledge in Indonesia. *Sexual Health* 17(2):167-177. Doi.10.1071/SH18199. PIMP; 32017868
- Sanam, B Nahid, M & Afsaneh, K (2021), Efficacy of digital health interventions used for adolescents sexual health: An umbrella Review. PMCD PMC. 11615421. PMCID 39533815
- Tazinya, Hajjar & Yaya (2022): Strengthening reproductive health integrated sexual and reproductive health and rights and HIV services programs to achieve sustainable development goals 3 and 5 in Africa. *Reproductive health journal. biome central*

- Telake, D. S., Abebaw, G. A., Dile, M., & Ayalew, Y. (2024). Sexual and reproductive health knowledge and service utilization among adolescents. *BMC Reproductive Health*, 21, 19. <https://doi.org/10.1186/s12978-024-0169-5>
- UNICEF (2020), turning the tides against AIDS will require more concentrated focus on adolescents and young people. data [unicef.org/hiv-aids/adolescents-young-people](http://data.unicef.org/hiv-aids/adolescents-young-people)
- United Nations (UN) (2020), 10 things you do not know about the world population. <https://www.un.org/youthenvoy/2018/04/10things-didn't-know-world-population>.
- United Nations (UN) (2020), Prevent adolescent pregnancy and keep girls in school. *Millennium Development Goal Report*. New York. UN publication
- Wadham, E Green, C Debottista, J Somerset, S & Sau, A (2021), New digital media intervention for sexual and reproductive health promotion among young people: A systematic Review. 16(2); 101123.doi10;1071/SH18127, PMID30819326
- Wanga, R Nuwanmanruya, E & Babigumira, J (2021), Utilization of a mobile phone application to increase access to sexual and reproductive health information, goods and services among University students in Uganda. *Reprod health*. <https://doi.org/10.1186/s12978-020-0137-z>
- WHO (2019), Millennium development Goal 5. Sexual and Reproductive Health. Retrieved from <http://www.who.int/reproductivehealth/topics/mdgs/en/index>
- Wike R, & Oates R (2019), Emerging nations embrace internet, mobile technology: Cell Phones nearly ubiquitous in many countries. Washington DC. *Pew Research Center*.
- Williamson, J (2020), SMS 4 SRH: Using Mobile phones to Reduce Barriers to Youth Access to Sexual and Reproductive Health Services and information. <http://www.mariestope-us.org/sites/www.msi.us.org/files/SMS%204%20%SRH20%28%29>
- World Health Organization. (2016). Global standards for quality health-care services for adolescents. WHO.
- World Health Organization. (2019). sexually transmitted infections (STIs): Fact sheet. WHO.