



Research Paper

Knowledge of the Treatment Modalities for Infertility among Couples in OBIO Cottage Hospital, Port Harcourt, Nigeria

Lawrence Ayah Iruo

Corresponding Author: liruo@pums.edu.ng
PAMO University of Medical Sciences
Port Harcourt, Nigeria.

OjongOfutOgar

Cross River State College of Nursing & Midwifery Sciences
Itigidi, Nigeria.

Pamela Awo-Ibiye Thompson

PAMO University of Medical Sciences
Port Harcourt, Nigeria.

Florence UchechiMandah

PAMO University of Medical Sciences
Port Harcourt, Nigeria.

LovelineNkeirukaOkoroafor

PAMO University of Medical Sciences
Port Harcourt, Nigeria.

Abstract

The study assessed the knowledge of the treatment options available to couples with infertility in a health care facility in South- South Nigeria. The theory that guided the research was Abraham Maslow Hierarchy of Needs. A descriptive Cross Sectional Study design guided the research. The instrument for data collection was a questionnaire developed by the researchers. The reliability of the instrument was found to be 0.88 using Chrombach Alpha reliability coefficient on a two week interval test retest basis. Eighty-six (86) respondents voluntarily participated in the research. Descriptive statistics (mainly percentages) was used in analyzing the data. The findings showed that all the respondents (100%) were conversant with what infertility is: but 76% of them believed that infertility is caused by evil spirits, while 79% of them believe that it is caused by witch craft. On the treatment options available, all of them (100%) were aware of adoption, fertility drugs, and IVF. But on the other hand, 93.1% of them were not aware of the availability of Intra-fallopian Transfer (IF) as a treatment option that is available for such clients. It was finally recommended that nationwide campaign aimed at educating the masses on infertility related issues and discouraging stigmatization/discrimination against such client; nurses should carry out awareness programs on the available methods of infertility management to ensure adequate knowledge of the subject matter.

Received 01 Sep., 2022; Revised 10 Sep., 2022; Accepted 12 Sep., 2022 © The author(s) 2022.
Published with open access at www.questjournals.org

I. Background to the study

The desire of every couple is to become parents within the first and second year of married life. While many couples have this dream fulfilled, some even regulate when they have gotten the numbers of children they want, some have more than they can carter for while there are quite a number of others who do not have even

one child no matter how hard they try. Infertility has remained a substantial source of worry among couples, cutting across decades and is expected to continue even into the nearest future (Copen, and Stephen, 2013).

Infertility is a problem which affects both men and women with almost equal frequency. However, women bear the brunt of this societal stigma in most of the cases. For women, pregnancy and motherhood are developmental milestones that are highly emphasized by our culture and a proof of her womanhood and justification of her place in the family (Ekwere et. al., 2015). Women are verbally or physically abused in their own homes, deprived of their inheritance, sent back to their parents, ostracized, looked down upon by society, or even have their marriage dissolved or terminated if they are unable to conceive (Ali et al., 2011). For the man, children bring social status and proof of virility, an attitude that boosts the male ego. The infertile man, more often than not, has a deflated sense of self-worth and self-fulfilment and might be looked down upon and often taunted by his peers in the society. Infertility among Nigerians is therefore seen as a humiliating personal tragedy for the couple but especially so for the female partner.

In Nigeria, infertility has been shown to have a high prevalence and in most cases is a social stigma for the childless couple. For example, several studies show a shocking prevalence rate of infertility in various parts of the country with 4.0% in North Central, 15.7% North West (Panti and Sununu, 2016); 15.4% in South East (Obuna et. al., 2012) and 48.1% in South West.

The need for further enlightenment of the populace on factors contributing to infertility has been emphasized in literatures (Aziken et. al., 2010). The ability of couples to live fully satisfying lives and achieve a better quality of life is largely dependent on their perception of the crisis situation and the coping strategies adopted. The need to therefore ascertain the perception of couples about infertility is brought to the fore as stakeholders in healthcare all over the world have implicated gender equality as an important index to drive sustainable development. If nurses, government and policy makers are aware of people's perception about infertility, it will help them develop programs to educate the populace and correct certain misconceptions. Enlightening the populace ought to be based on evidence gathered through researches, hence the impetus for this study and the need for the study to determine the treatment options of infertility among couples attending fertility clinic in the Rivers State Teaching Hospital (RSUTH), Port Harcourt Rivers State.

Statement of Problem

Every human being has a right to the enjoyment of the highest attainable standard of physical and mental health. Individuals and couples have the right to decide the number, timing and spacing of their children. Infertility can negate the realization of these essential human rights. Marriage, they say, is for companionship and procreation. The expectation of parents is for their children to procreate within the first year of marriage. Where this does not happen, pressure for grandchildren is mounted on the couples. According to Panti and Sununu (2016), infertility no doubt remains a global health problem and a socially destabilizing condition for couples, carrying several stigmas and a cause of marital disharmony. The impact of infertility on couples can be overwhelming with emotional and psychosocial concerns (Mittal et. al., 2015). One out of six couples face infertility related complications worldwide (Pittman, 2013). Couples with infertility experience significantly more anxiety, depression, and stress (Iruo, et al 2021); all of which could contribute to marital distress and divorce (Schanz et. al., 2011).

Infertility worldwide remains a major gynaecological problem with devastating psychosocial effect on the couple (Odejide et. al., 1986, 2013). Infertility is today a palpable problem in many families in Nigeria. It is a common reason for routine gynaecological consultations. Infertility is a source of distress for couples as societal norms and perceived religious dictums may equate infertility with failure on a personal, interpersonal, emotional or social level. Its negative impact on the peace and stability of the affected families is becoming conspicuously increasing every day (Animasahun, et. al., 2013). Awareness, knowledge and attitude regarding infertility among couples have been the focus of numerous studies. Some of these studies have also focused on the causes of infertility; however, studies on the management options of infertility especially in Port Harcourt, Rivers State are very few. Also, diagnosis and treatment of infertility are not prioritized in national population and development policies and reproductive health strategies are rarely covered through public health financing making it difficult for low-income earners to assess quality fertility care. An assessment of the treatment options available and known by the couple should be addressed to curb the myths and stigma on couples with infertility. It is for this reason that the researchers decided to carry out this study in this health care facility in order to address some of these gaps.

Specific Objectives

The specific objectives of this study are to:

- i. To assess the level of knowledge of the couples on infertility issues.
- ii. To assess the level of knowledge on the management options available for couples in Obio Cottage Hospital on infertility.

Research Questions

- i. What is the level of knowledge of couples in Obio Cottage Hospital on infertility?
- ii. What is the level of knowledge of couples in Obio Cottage Hospital on the management options available for infertility?

Knowledge of Infertility

Infertility is a disease of the male or female reproductive system defined by the failure to achieve a pregnancy after 12 months or more of regular unprotected sexual intercourse (WHO, 2018).

Infertility is divided into primary and secondary infertility. Secondary infertility refers to the inability to conceive following a previous pregnancy.

Surprisingly, secondary infertility has contributed immensely to these sad experiences which in most cases are preventable. A staggering statistic by Panti and Sununu (2016) showed that primary infertility constituted 32.8%, while secondary infertility was 67.2%. Female gender-related causes of infertility accounted for 42.9% and male causes accounted for 19.7%. Both partners contributed to infertility in 16.7%, while no cause was found in 20.7% of patients. This trend has also been reported in Pakistan (Ali et. al., 2011). Contrary to the traditional belief that always attributes infertility to the woman, findings have shown that factors responsible for infertility could arise from either the male or the female or both. According to Triptiet. al., (2011), overall factors responsible for infertility, male factors comprise 30-40% in the male, female factors 40-55%, and combined factors comprise nearly 10%. In approximately 10% cases the cause of infertility remains unexplained, and the couple is designated as normal infertile couple.

A couple is generally considered infertile if they are unable to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse without use of contraceptives (WHO, 2010; Sami et al., 2012). It could also be defined as 12 months of appropriately timed intercourse that does not result in conception. The World Health Organization defines infertility as the inability of couples of reproductive ages to impregnate or conceive and carry a pregnancy to live birth within two years of exposure to the risk of pregnancy (Animasahun et. al., 2013). The World Health Organization recommends modifying the clinical infertility definition for use in epidemiological research as follows: "The absence of conception in 24 months of regular unprotected intercourse." WHO proposed to extend the period of trying to get pregnant from 12 to 24 months, because it had been found that many couples who did not get pregnant in a period of 12 months, did eventually get pregnant without treatment (Odek et. al., 2014). It also includes the inability to carry a pregnancy to the delivery of a live baby (Uadia and Emokpae, 2015). Infertility could be classified as either primary or secondary.

Definitions of primary infertility vary between studies, but the operational definition, put forth by the WHO, defines primary infertility as the "Inability to conceive within two years of exposure to pregnancy (i.e. sexually active, non-contracepting, and non-lactating) among women 15 to 49 years old". Infertility is a disease of the male or female reproductive system defined by the failure to achieve a pregnancy after 12 months or more of regular unprotected sexual intercourse (WHO, 2018). It also refers to couples who have never conceived. Secondary infertility is usually defined as the inability to conceive for after having conceived at least once before (Ghadir et. al., 2013).

Causes of Infertility

Both partners in relationship contribute to potential fertility and both may be sub fertile. The female factors contribute almost half in the etiologies of infertility followed by male factors (30-40%), and the rest are attributed to a mixture of both or by problems unknown. In the male reproductive system, infertility is most commonly caused by problems of ejection of semen, absence or low levels of sperm, or abnormal shape (morphology) and movement (motility) of the sperm. Infertility may be caused by a number of different factors, in either the male or female reproductive systems. However, it is occasionally not possible to explain the exact causes of infertility. In the female reproductive system, infertility may be caused by a range of abnormalities of the ovaries, uterus, fallopian tubes, and the endocrine system, among others (WHO, 2018). In the female reproductive system, the following can contribute to causing infertility: tubal disorders such as blocked fallopian tubes, which are in turn caused by untreated sexually transmitted infections (STIs) or complications of unsafe abortion, postpartum sepsis which causes secondary infertility or abdominal/pelvic surgery; uterine disorder which could be inflammatory in nature (such as endometriosis), congenital in nature (such as septate uterus), or benign in nature (such as fibroids); disorders of the ovaries, such as polycystic ovarian syndrome (PCOS) and other follicular disorders; disorders of endocrine system causing imbalances of reproductive hormones. The endocrine system includes hypothalamus and the pituitary glands. Examples of common disorders affecting this system include pituitary cancers and hypopituitarism. Infertility in the male may be caused by: obstruction of the reproductive tract causing dysfunctionalities in the ejection of semen. This blockage can occur in the ejaculatory ducts and seminal vesicles, these blockages are commonly due to injuries or infections of the genital tract; hormonal disorders leading to abnormalities in hormones produced by the pituitary gland, hypothalamus and testicles (pituitary or testicular cancers); testicular failure to produce sperm, for example due to varicoceles or

medical treatments that impair sperm-producing cells (such as chemotherapy); abnormal sperm function and quality. Conditions or situations that cause abnormal shape (morphology) and movement (motility) of the sperm negatively affect fertility. For example, the use of anabolic steroids can cause abnormal semen parameters such as sperm count and shape. (Gore AC et. al., 2015).

The biological and social factors including stress due to economic status, religious attitudes, age at marriage, urbanization leading to modernization, higher literacy, contraceptive usage and nuclear families play a significant role in lowering fertility (Mittal et. al., 2015). Sexually transmitted infections (STIs) are generally considered the leading preventable cause of infertility worldwide, especially in developing countries (Adamson, Krupp, Alexandra, Jeffery, Arthur and Purnima, 2011). The causes of infertility has also been categorized into four main causes; male infertility when it is principally due to poor semen parameters, female infertility when infertility is due to factors such as occlusions of fallopian tubes, uterine or endometrial abnormalities, abnormal cervix and anovulation in female partner (Uadia and Emokpae, 2015).

Impact of sexually transmitted diseases

Sexually transmitted infections (STIs) are common problems that are associated with male factor infertility. A study conducted to identify potential risk factors for male infertility in southern Nigeria indicated that there were associations between male infertility and previous exposures to sexually transmitted diseases, unorthodox medication (native medication) and moderate to heavy alcohol consumption. Men who reported having repeated episodes of penile discharge, painful micturition, genital ulcers and testicular pain were more likely to be infertile.

Another study of a group of 500 males investigated for infertility in Kano, Northern Nigeria, reported 40.8% prevalence of male factor infertility. The organisms isolated were *Staphylococcus aureus*, *Escherichia coli*, *Candida* species, the mixed growth of *S. aureus* and *E. coli* and *Streptococcus* species. Seminal fluid infection contributed in no small measure to reduced sperm density, asthenospermia, and teratospermia. *S. aureus* that contributed the most to seminal fluid infection has always been dismissed by most practitioners as mere contamination, hence of no significance. It was concluded in that report that in the management of male factor infertility, this micro-organism should be treated and no longer ignored. The study also observed that the rate (percent) of infection increased from normospermic 14.8%, oligospermic 35.2%, severe oligospermic 44.1%, to azoospermic 74.7%. These infections of seminal fluid often lead to a decrease in the number of spermatozoa and the suppression of their fertility capacity. Microbial infection of the seminal fluid was observed to be the major cause of male infertility. The negative influence of pathogenic micro-organisms on sperm cells' reproductive potential has been observed. Evidence that *Chlamydia trachomatis*, *Ureaplasma urealyticum* affect fertility and that *Mycoplasma hominis* cause tail abnormalities of spermatozoa abound. The five factors that contribute to overall sperm quality such as sperm motility, speed, density, morphology (shape and size) and liquefaction are all affected by STIs (Onyeka et al., 2012).

Factors Associated with Infertility among Couples

This could be genetic, physical abnormalities, injuries, drugs, infections of the genital tract, radiation, toxins or unexplained. The major causes of male factor infertility in Nigeria are infection and hormonal abnormalities. Other studies have focused on the contributions of environmental factors, such as diet and toxic elements, cultural behaviors, and genetic factors that a fifth of the men tested positive for antibodies to *Chlamydia*.

Life style

The role that life style plays in the development of infertility has generated a considerable amount of interest. These are the modifiable habits and ways of life that can influence human health and fertility. Many life style factors such as age at which one starts a family, nutrition, body weight, and substance abuse can impact adversely on fertility (Sharma, et. al., 2013).

Age

The age at which a person starts a family may affect fertility in both males and females because fertility peaks and decreases with increasing age. In males, the levels of testosterone decrease as men age and semen parameters deteriorate progressively as from 35 years (Stewart and Kim, 2011; Kimberly et. al., 2012). After 40 years of age, men have significantly more DNA damage in the semen as well as poor sperm indices (Varshini et. al., 2012).

Nutrition

Food rich in antioxidants are potentially beneficial for fertility while the consumption of diets high in proteins and fats were reported to impact negatively on fertility (Onyeka, et. al., 2012). Antioxidants play important roles in the body by scavenging reactive oxygen species (ROS) which are produced as by-products of cellular respiration. The endogenous antioxidants present in the body help to eliminate or prevent their harmful effect, but over production of these ROS in the absence of adequate amount of antioxidants results in oxidative stress which may negatively impact on sperm function (motility, decreasing membrane integrity and DNA damage).

Hormonal abnormalities

Endocrinologic disorders and infertility are common all over the world. Because several authors have suggested that infertility in Africa is due to the high prevalence of sexually transmitted diseases, we decided to evaluate the contributions of endocrine abnormalities to infertility in the male in Kano, Nigeria. Hormonal abnormalities were detected in 22% oligospermic, 40.7% in severe oligospermic and 42.7% in azoospermic male subjects.

The pretesticular and the testicular causes are mainly endocrine disorders originating from the hypothalamic-pituitary-gonadal axis that have adverse effects on spermatogenesis. Male fertility is critically dependent upon the normal hormonal environment. Therefore, appropriate evaluation and treatment of the sub-fertile men are critical in the delivery of suitable care to the infertile couple. The pattern of abnormalities observed in oligospermia was hypergonadotropic-hypogonadism and hypogonadotropic-hypergonadism, while hypogonadotropic-hypogonadism and hyperprolactinaemia were observed in severe oligospermic males. Also, primary hypogonadism, secondary hypogonadism and hyperprolactinaemia were observed in azoospermic males. Evidence in man suggests that luteinizing hormone (LH) and FSH through the action of testosterone are required for the initiation and maintenance of spermatogenesis. Testosterone, in addition, is important in maintaining the seminiferous epithelium. This action of testosterone is mediated through androgen receptors within the Sertoli cell. Male hypogonadism may indicate an impaired synthesis of testosterone by the Leydig cells or insufficient spermatogenesis due to seminiferous tubular dysfunction. This is so because extensive biochemical communication occurs in the Leydig cells and the tubules. When there is a disturbance in the hormone releasing processes the whole process leading to spermatogenesis is disrupted.

The Increase in serum FSH level in azoospermia may reflect decreased testicular activity resulting in changes in normal feedback mechanism between the testes and the hypothalamic-pituitary axis. Hyperprolactinaemia was observed in two patients with oligospermia and six azoospermic males coupled with low semen volume. The mechanism by which hyperprolactinaemia leads to infertility in the male is not well understood, but it may lead to reduced gonadotropin releasing hormone (GnRH) secretion by slowing the frequency of GnRH pulses, thereby reducing LH and FSH pulsatility. It may also alter the positive feedback mechanism on the hypothalamus.

Hormonal profile of a group of azoospermic males was evaluated and it was observed that 40% of all azoospermic subjects had abnormal hormonal levels while 60% had normal hormonal values and 45% of the subjects had testicular pathology. It was concluded that endocrinopathies are common in azoospermia and their contribution to male infertility is great. Other studies in Nigeria recognized that azoospermia is a common finding among infertile males. The condition was present in 6.5% of males attending a general infertility clinic and 35% in those attending male infertility clinics (Marinho, 1986 in Uadia and Emokpae, 2015).

The major causes of azoospermia such as failure of spermatogenesis and obstruction of the ductal system especially the vas deferens have been studied. It was observed that blockage of the vas deferens was not a major cause of azoospermia in Nigeria. This observation was corroborated by findings that only one subject was fructose positive of all azoospermia evaluated for seminal fructose. Seminal fluid fructose is usually done for all azoospermia to ascertain the presence or absence of vas deferens. Fructose produced in the seminal vesicles is androgen dependent and serves as a source of energy for ejaculated sperm cells. It is absent in subjects with congenital absence of vas deferentia who have no seminal vesicles and those with bilateral ejaculatory duct obstruction.

Histological examination of testicular biopsies in azoospermic condition showed that the condition was due to primary testicular defects in half of the subjects investigated. Among the abnormalities detected were spermatogenic arrest, testicular atrophy, and hypospermatogenesis. The chromosomal abnormality was observed in one subject as a genetic factor contributory to male factor infertility.

Erectile dysfunction

In a retrospective study of 115 subjects with ED, we observed different patterns of hormonal abnormalities in 48.7% of the subjects. These include primary hypogonadism (10.4%), hypogonadotropin (26.1%) and isolated low FSH (12.2%). No endocrine disorder was observed in 51.3% of the subjects. It was concluded that endocrine disorders are common in patients with ED and, therefore, essential in the management of these patients (Emokpae, et. al., 2006). The findings of reproductive hormone derangements in ED may further complicate the reproductive potentials of the patients.

Female infertility

Female factor infertility can be divided into several categories: cervical or uterine, ovarian, tubal and other (Ugwu, et. al., 2012).

Abnormalities or damage to the fallopian tube interferes with fertility and is responsible for abnormal implantation such as ectopic pregnancy (Adegbola et. al., 2013). Obstruction of the distal end of the fallopian

tubes may result in hydrosalpinx and pyosalpinx. Other tubal factors associated with infertility are either congenital or acquired.

Congenital absence of the fallopian tubes can be due to spontaneous torsion in utero followed by necrosis and reabsorption. Elective tubal ligation and salpingectomy are acquired causes. Tubal factors are responsible for 25 to 30% of infertility cases, with salpingitis being the most common cause, representing more than half of the cases. Estimates show that after one episode of pelvic inflammatory disease (PID), an 11% risk of tubal infertility is present.

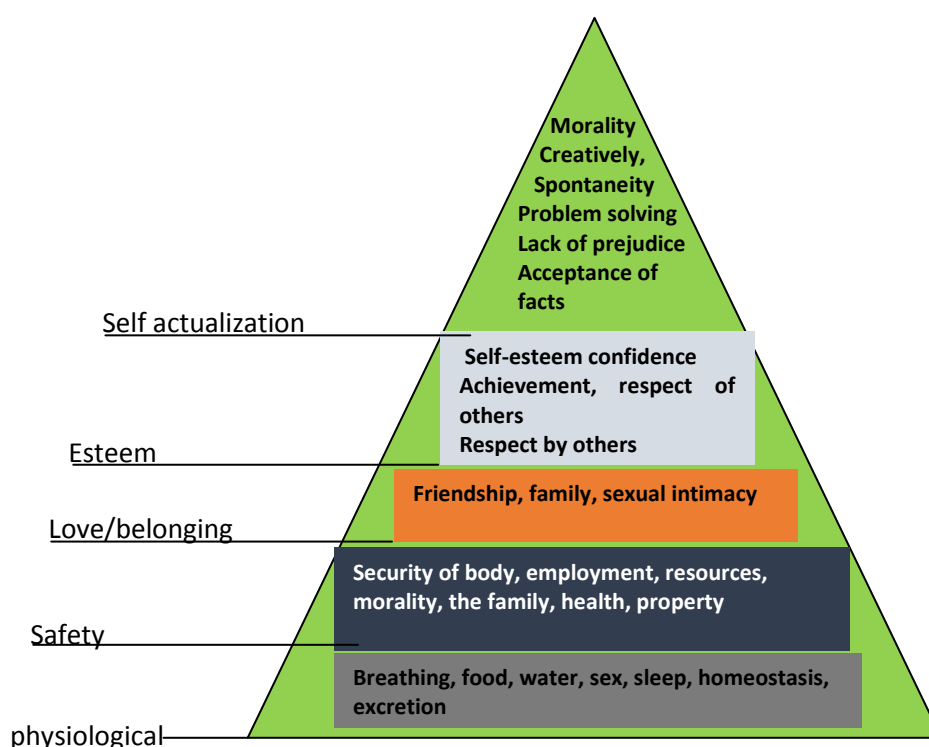
Management of Infertility

Fertility care encompasses the prevention, diagnosis and treatment of infertility. Equal and equitable access to fertility care remains a challenge in most countries: particularly low and middle-income countries (LMIC). Fertility care is rarely prioritized in national universal health coverage benefit package (WHO, 2018). Availability, access, and quality of interventions to address infertility remain a challenge in most countries. Male infertility can be managed through counseling, hormonal and drug therapy as well as surgical intervention. The prognosis depends on the duration of infertility, primary or secondary infertility, results of the seminal analysis, age and fertility status of the female partner (Jungwirth, Diemer, Dohle, Giwercman, Zopa, Krausz, *et al.*, 2012). Depending on the life style of the subject, he could be counseled against heavy smoking, alcohol abuse, use of anabolic steroids, engaging in extreme sports, wearing of thermal underwear and occupational exposure to heat sources. The use of antioxidant supplements such as Vitamins E, A and C, zinc, selenium and antibiotics administration may help to improve semen quality. In subjects with endocrine abnormalities, the use of drugs and endocrine replacement therapies may be helpful. Surgical treatment may be carried out to correct pathological conditions that include varicocele and epididymal obstruction. Anejaculation can be treated by vibro-stimulation or electro-ejaculation techniques (Damani and Shaban, 2008). However, with most infertility attributable to idiopathic oligospermia and other sperm abnormalities, interventions have failed to resolve this condition. Improvements in technologies have made assisted reproductive techniques possible (Damani and Shaban, 2008). Techniques such as intra uterine insemination, *in vitro* fertilization, sperm extraction techniques, and micro assisted fertilization are now available. These procedures are beyond the reach of the ordinary man on the street, hence the urgent need for government and other donor agencies to assist in the treatment of male infertility.

Broadly, treatment options for infertility can be classified into three (3) major groups which are the pharmacological (medicines such clomifene citrate, tamoxifen, metformin, gonadotrophins, gonadotrophin-releasing hormone and dopamine agonists), the surgical (fallopian tube surgery, Endometriosis, fibroids, Polycystic Ovary Syndrome-PCOS, surgical extraction of the sperm, correcting an epididymal blockage) and Assisted Reproductive Techniques or Assisted Conception (intrauterine insemination with (SO + IUI) or without (IUI) super ovulation, in vitro fertilisation (IVF), Egg and Sperm donation and Surrogacy).

Theoretical Framework

This research is guided by Abraham Maslow's Hierarchy of Needs which was propagated by Abraham Maslow in 1943. He identified certain needs of the individual that ought to be met at certain times while some needs are to be met at all times. The theory has five basic needs of human wants or accomplishment which are prioritized from lowest to highest level of needs. According to Dohney, Cook and Stopper (2007), Maslow noted that the person's human needs are identified in terms of a hierarchy. Lower level needs must be met before energy can be directed towards higher level needs. It is presented in ascending order as shown in the illustration below.



Source: © Alan Chapman 2001-4 based on Maslow's hierarchy of needs from [http:// www.businessballs.com](http://www.businessballs.com). Maslow stated that these needs are prioritized hence the lower level needs must be satisfied first before the higher-level needs. When one level of need is met, an individual then moves to another level. Physiological Needs is the most important and common to all needs described.

Physiological Needs

This is the lowest and the first level of need identified by Maslow's law. It contains the basic essential human needs for optimal living and survival e.g. oxygen, food, water and sex etc. individuals seek to meet up with these needs on daily basis.

According to Tay and Diener (2011), the satisfaction of physiological needs in infertile couples can be denied in marriages. There is lowered or loss of sexual desire, arousal and frequency of orgasm by infertile couples compared with their counterparts. In this case, sex seems useless due to their inability to produce children. Conflict and tension in the homes may lead to depression and restlessness which may result in insomnia. For this, the satisfactions of their physiological needs are neglected.

Safety and security needs

According to Tay and Diener (2011), for optimal performance, human being needs to be secured and protected from harm in all aspects of life. This includes physical safety from family violence, health, wellbeing, economic safety, financial security and personal security e.g. job, marriage, properties etc. Couples with infertility are bombarded with embarrassments and insults in their communities and are denied their rights during communal sharing. The men also face humiliation from their friends and families which sometimes leads to pressure on men to divorce their wives or engage in polygamy.

Love and belongings

Kenrick (2010) opines that the need to love, to be loved and feel belonged in the society is the desire of every individual. This is achieved through living a happy life and having an ideal family relationship. In marriages, due to the problems caused by infertility, marriage instabilities, hatred, conflict, separation, crises and divorce leave couples love diminished.

Self-esteem needs: (worth and values)

According to Vanbaten and Bos (2009), esteem presents the normal human desire to be accepted and valued by others. For this, every human has a need to have self-esteem and to be respected by people. Imbalance of this level of needs leads to low self-esteem. In relation to marriages, a reproductive marriage is balanced of self-esteem, recognition, worth and value. On the other hand, in infertile marriages, these needs are not met. Couples with infertility experience depression, perceived loss of control etc over many aspects of their lives and social isolation.

Self-actualization

This level of need pertains to what a person's full potentials are. Willard (2012) submits that in every marriage, couples' self-actualization goal is the desire to be fertile, reproduce a child and become an ideal parent. The inability to conceive and bear a child after marriage results in the feeling of disappointment in a couple's reproductive live, thereby hindering their self- actualization goal.

Application of the theory to the study

Every human being has a right to the enjoyment of the highest attainable standard of physical and mental health. Individuals and couples have the right to decide the number, timing and spacing of their children. Infertility can negate the realization of these essential human rights. Maslow's Hierarchy of Needs and its relationship to the study of the assessment of infertility among couples in marriages shows that the various hierarchy of needs of every human e.g. physiological needs, safety and security needs, self-esteem needs and self-actualization needs are essential needs that are important in every life process that the couples face. But due to the problem of infertility, these needs may become jeopardized, denied, altered and neglected. For instance, in Physiological needs, the desire for sexual intercourse among the couples becomes more like a 'duty' than an enjoyable way to express love for each other. Every married couple's self -actualization needs are achievement of child birth to maintain the existence of family name in years to come. But with infertility these needs are not met. Couples with infertility see themselves as failures to their reproductive right and unfulfilled life.

Furthermore, they may end up not loving themselves. The man will deny the woman of care e.g. food, money, personal security, health and in turn may not receive care. Their sense of worth and value becomes worthless. Conflicts may set in leading to divorce and separate problems, couples' needs become jeopardized and this impact negatively on their quality of life but with fertility, these needs can be achieved.

II. Empirical Review

Pattern/Profile of Infertility in Nigeria and other countries

Panti and Sununu (2014) in their prospective study conducted at the Gynecological Department of the UsmanDanfodiyo University Teaching Hospital (UDUTH), Sokoto determined the prevalence, causes, and clinical pattern of infertility between 1st January, 2011 and 31st July, 2011 where all the patients that presented with infertility within the study period were recruited into the study. Relevant demographic, clinical, and laboratory/radiological data were documented using a structured questionnaire. Findings showed that out of a total of 1,264 new gynecological cases seen during the study period, the prevalence of infertility was 15.7%. Primary infertility constituted 32.8%, while secondary infertility was 67.2%. Previous history of evidence of genital infection including lower abdominal pain (78.8%) and vaginal discharge (76.6%) were common. Female gender-related causes of infertility accounted for 42.9%; male causes accounted for 19.7%. Both partners contributed to infertility in 16.7%, while no cause was found in 20.7% of patients. Chronic pelvic pain, previous vaginal discharge, and dyspareunia were the commonest features being present in 156(78.8%), 152(76.6%), and 132(66.7%) patients, respectively. In conclusion, the study shows a dominance of secondary infertility with probable genital tract infection being a major contributor.

A retrospective descriptive study by Ekweret. al., (2007) based on findings from clinical files of infertile couples presenting at gynaecology and fertility clinics showed that the obvious causes of infertility constituted 58% in females, 30% in males and 12% in both partners. Primary infertility was found in 69.7% of males and 34.5% of females; secondary infertility in 30.3% of males and 65.5% of females. Infection appears to be a strong predisposing factor to infertility in both male and female patients. By the time of consultation, they had been married for a mean period of 6years (range 1 – 12years) whilst the women had been married for a mean period of 4years (1 – 15years). Mean age of the males was 33.3 ± 5.7 years with a range of 23 – 50years; that of the females was 25.8 ± 3.2 years with a range of 16 – 39years. The peak incidence of infertility among the male population was in the 30 – 34years age group where among the females it was seen in the age group 20 – 24years. No female older than 39 years sought for medical help about infertility.

Sultana, Tanira, Adhikary, Keya and Akhter (2014) carried out a cross sectional study was to explain the causes of infertility among the couple attending infertility unit and found that the age group of 25-30 years was the most vulnerable as they represented 52% of primary and 51.42% of secondary infertility. Among the 110 sub-fertile couples, 43.63% had female factor problems; 20% were suffering from male factor problems. In 21.81% of cases both male and female were responsible. In 14.54% cases, there were no causes, and, therefore, remain unexplained infertility. Among women, primary sub-fertility was 68.18%, secondary sub-fertility was 31.81% and among men, it was 79% and 21% respectively. Most of the infertile couples (43.64%) were trying for 2-5 years. In this study, most common cause was ovarian dysfunction (33.63%). Among them, anovulation with regular menstruation was found in 60%, polycystic ovarian disease in 32%, hyperprolactinaemia in 16% cases. Bilateral tubal occlusion was found in 8% and pelvic adhesions in 24% by doing laparoscopy. In addition,

10% of patients had endometriosis. Fibroid uterus was found in 26% cases. Among the primary sub-fertility cases, common causes were anovulation with regular menstruation (14.66%) and polycystic ovarian disease (12%). 40% of secondary sub-fertility was related with menstrual regulation (MR). Among male factors, azoospermia was found in 6.36% cases, oligozoospermia in 10.9% cases, asthenozoospermia 18.18%, teratozoospermia was in 6.36% cases.

In the study conducted by Ali, Sophie, Imam, Khan, Ali, Shaikh and Farid-ul-Hasnain (2011), participants were asked about their views on infertility and marital outcomes. The majority of participants did not think male or female infertility were grounds for divorce (Ninety one percent of them did not consider female infertility as grounds for divorce, as opposed to 59% who did not consider male infertility as grounds for divorce). However, 57% believed that female infertility is a valid reason for a man to have a second marriage. Out of the people who were in favor of the second marriage, 70% were male ($p < 0.05$). On inquiring who they thought was being blamed for infertility in the society, most of the respondents replied that it is usually the woman (86%). Participants were further asked about the social acceptability of various options available for infertile couples. Out of the people who were aware of fertility drugs for treatment (11% of total participants), 94% considered it to be acceptable. However, having a test-tube baby was not socially acceptable to the majority (55%) of patients who knew about it (22% of total participants). People were quite positive about the option of adopting a child and 92% agreed upon adoption as an option for infertile couples.

In a study carried out in Ibadan, more than half (54.5%) reported a history of primary infertility while 45.5% had secondary infertility, out of the clients with secondary infertility, 15.3% still want more children even after two children, while 6.4% desired to have more children after having three. Fifty-two per cent of the respondents held a negative attitude towards the use of ART. More than half (53.0%) preferred spiritual exercise (praying and fasting) as an alternative to the uptake of ARTs, while 50.8% would not encourage the spouse to make use of the services. However, 64.1% would encourage anyone to access ART services with 50.0% expressing non-religious sentiments towards ARTs (Akanke et al., 2019). Less than half (42.0%) of the respondents were willing to adopt ART if provided in public hospitals; Among those respondents with a reported history of primary infertility, 45.0% indicated their willingness to uptake ART services as against 31.0% with a history of secondary infertility. Most preferred type of ARTs were IVF (80.0%) and gamete intra-fallopian transfer (GIFT) (50.6%). In addition, a few respondents (10.7%) were willing to make use of donors' sperm insemination (DSI) method, while 10.6% reported a willingness to accept donors' egg for conception.

A study by Adewumi et al., (2012) carried out in the gynaecologic clinic of Lagos State University Teaching Hospital, it was shown that almost all respondents (97.2%) were aware of child adoption, and the most common sources of knowledge were friends (47.8%) and the media (39.7%), while health care providers were the source of knowledge in 4.4% of respondents. Two hundred and thirty-six (47.5%) respondents believed that treatment would have the desired outcome. Most based their belief on faith (79.9%), but 20.3% based their belief on the success rates of the treatment options. In this study, 235 (47.0%) respondents thought that adoption should be encouraged and 211 (42.6%) said that they were willing to adopt if their infertility became intractable.

Global Epidemiology and burden of infertility in Nigeria

An average prevalence rate of 10-15% in the developed countries (Alvarez, 2006), Infertility rates among married couples in African countries range from 15% to 30% (Umeora, Mbazor and Okpere, 2007), with the prevalence of infertility has been notably highly variable in sub-Saharan Africa ranging from 20-46%. This has been attributed to high rate of sexually transmitted diseases, complications of unsafe abortions, and puerperal pelvic infections (Idrisa, 2005).

Due to a dearth of reliable statistics on fertility and other demographic issues in Nigeria, the actual prevalence of infertility is not known. Official statistics however puts the rate of childlessness at 11% (Nigerian Fertility Survey Ekwere, et. al., 2007). The true figure could be much higher. But institutional-based incidence of infertility reported in some parts of Nigeria are 4.0% from Ilorin (North central) (Abiodun, Balogun and Fawole, 2007), 15.4% from Abakaliki (South east), (Obuna, Ndukwe, Ugboma, Ejikeme and Ugboma, 2012), 48.1% from and Oshogbo (South west) (Adeyemi, Adekanle and Afolabi, 2009). In the southwest, male factor was reported to be responsible for 42.4% infertility cases (Ikechebelu, Adinma, Orié and Ikegwuonu, 2003), while in Maiduguri, North-Eastern Nigeria, infertility is the reason for about 40% of all gynecological consultations (Idrisa, Kawuwa, Habu and Adebayo, 2003). In Kano, 40.8% prevalence was reported, 46% in Ile-Ife (Uadia and Emokpae, 2015) and 55-93% was observed in Enugu Eastern Nigeria for male factor infertility (Chukudebelu, 1978 in Uadia and Emokpae, 2015).

Experiences from clinical practice in Nigeria indicate that infertility is a major burden on clinical service delivery in Nigeria. Several reports indicate that infertility is the most frequent reason for gynecological consultation in Nigeria (Owolabi, Fasubaa and Ogunniyi, 2013). More than 50% of gynecological caseloads are as a result of infertility consultations and over 80% of laparoscopic investigations are for management of infertility (Orhue and Aziken, 2008).

Study Area

Obio Cottage Hospital (OCH) was established in 1978 by the Rivers state government. It started as a primary health centre (PHC) providing preventive and curative health care services to mostly indigenes of Obio/Akpor Local Government Area (LGA). More than two decades later, Shell Petroleum Development Company (SPDC) started supporting the hospital as part of its social infrastructure programme. The SPDC upgraded and rehabilitated the facility converting it from a 4 bed health care centre operating on a small twin bungalow building with 13 staff, to a 40 bed facility with over 100 staff (Adexen, 2021).

Study Design

The study adopted a descriptive cross-sectional study design in order to assess the level of knowledge on infertility and the management options known by couples in Obio Cottage Hospital, Port Harcourt Rivers State. Polit and Beck (2012) opines that the purpose of descriptive studies is to observe, describe, and document aspects of a situation as it naturally occurs.

Population of Study

A study population of 132 was proposed for the study. This was the daily average of married people who came to the hospital in a particular month. But when the data was collected, only 107 married people came to the facility. Out of the 107, some abstained leaving a balance of 86 respondents for the research.

Instrument for data collection

Data was collected using a questionnaire designed by the researchers. The questionnaire consists of four sections (A, B and C); Section A contains ten items on socio-demographic characteristics of the respondents. Section B contained items on knowledge of couples about infertility. Section C comprised items on management options known and utilized by couples

Reliability of Instrument

The reliability of the instrument was determined using the test-retest method. Ten copies of the instrument were administered to couples attending the fertility clinic in University of Port Harcourt Teaching Hospital, Rivers State and were re-administered two weeks later. The reliability coefficient of 0.88 was calculated using the Chronbach's alpha reliability coefficient (Chronbach's alpha is a measure of internal consistency, which is how closely related a set of items are as a group).

Method of Data Analysis

The collected data was analyzed using the statistical program; Statistical Package for Social Sciences (SPSS). The data was subjected to descriptive (i.e., frequency distribution tables, percentages, proportions, bar charts, pie charts, mean and standard deviations). Descriptive statistics was used to describe characteristics of the study participants and the study variables.

Ethical Consideration

The project was submitted to the ethical committee of the hospital for approval. All data collected was handled with confidentiality. None of the participating respondents was identified by name at any point during data collection/manuscript preparation. With the desire to make the answers in the survey as reliable as possible, the participants were informed that the data collection was voluntary and totally anonymous; hence, informed consent was obtained.

III. RESULTS

Of the 107 individuals eligible for this, 86 agreed to participate in the study and were able to fill out and submit the questionnaires administered, resulting in a response rate of 80.4%.

Table 1 shows the socio-demographic variables of respondents. The mean age of respondents was 32.9 ± 6.47 . Majority, 79.1% of the respondents were females while 20.9% were males. On the marital status of respondents, 44.2% were married, while 12.8% were single and 6.95 were widowed. Furthermore, the mean duration of marriage was 13.2 ± 7.1 . Majority of the respondents had attained a level of tertiary education which constituted 62.8% of the total population. A greater number, 88.4% of respondents did not report fertility in the family. However, 36.0% were unable to achieve any pregnancy while 46.5% able to achieve one pregnancy with a mean duration of infertility being 16.1 ± 7.1 . Most of the respondents, 44.2% reported to have only one living child.

Research question 1: What is the level of knowledge of couples on infertility?

Table 2: Knowledge of Respondent on Infertility

Variables	Category	Frequency (n = 86)	Percentage (%)
Infertility is the inability to achieve a pregnancy after how long?	6 months	5	5.8
	12 months	43	50.0

Knowledge of The Treatment Modalities For Infertility Among Couples In OBIO Cottage ..

	18 months	26	30.2
	24 months	12	13.9
Types of infertility include:	Primary	86	100
	Secondary	86	100
	Tertiary	29	33.7
Who can be affected by infertility?	Man	80	93.0
	Woman	84	97.7
	Both	86	100
	None	2	2.3
Cause and risk factors of infertility in women:	STIs	86	100
	Abnormal Menstruation	84	97.7
	Smoking	75	87.2
	Alcohol consumption	70	81.4
	HIV/AIDS	38	44.1
	Diabetes mellitus	26	30.2
	Drugs	79	91.9
	Genetic make-up	82	95.3
	Evil spirits	68	79.1
	Witchcraft/curse	66	76.7
	Tubal obstruction	84	97.7
	Polycystic ovarian Syndrome	80	93.0
	Smoking	76	88.4
	Alcohol consumption	80	93.0
Causes and risk factors of infertility in men:	Erectile dysfunction	85	98.8
	Diabetes mellitus	46	53.5
	HIV/AIDS	40	46.5
	Pelvic surgery	75	87.2
	Genetic make-up	81	94.2
	Evil spirits	63	73.3
	Witchcraft/curse	67	77.9
	Low sperm count	86	100
	Yes	78	90.7
	No	8	9.3

In table 2 above, the level of knowledge of respondents on infertility was represented. 50.0% of respondents agreed that infertility is the inability to achieve a pregnancy after 12 months, whereas 5.8%, 30.2% and 13.9% all agreed that infertility is the inability to achieve a pregnancy after 6, 18 and 24 months respectively. All respondents, 100% agreed that there are primary and secondary types of infertility, while a smaller proportion, 33.7% of the total population agreed that there is a tertiary type of infertility. All respondents, 100% also agreed that infertility can affect both men and women, while 2.3% of the population believes that infertility can affect neither the man nor woman. Regarding the causes and risk factors of infertility in women, 100% agreed that sexually transmitted infections (STIs) can cause infertility, whereas 95.3% agreed that infertility is caused by genetic make-up, 79.1% and 76.7% agreed that infertility can be caused by evil spirits and witchcraft/curse respectively. On the other hand, 98.8% of respondents agreed that erectile dysfunction is a cause and risk factor of infertility in men. All respondents, 100% agreed that low sperm count is a cause of infertility in men. Majority, 90.7% agreed that infertility can be treated. The percentage level of knowledge of couples is shown that the total level of knowledge of the respondents is 83.7% which indicates good knowledge, while the remaining 16.3% signifies poor knowledge.

Research Question 2: What is the level of knowledge of couples on the treatment/management options available for infertility?

Table 3: Knowledge of available management options

Variables	Frequency (n=86)	Percentage
Fertility drugs	86	100
Gamete Intrafallopian Transfer (GIFT)	08	9.3
Zygote Intrafallopian Transfer (ZIFT)	06	6.9
In Vitro Fertilization (IVF)	86	100
Intra Cytoplasmic Sperm Injection (ICSI)	-	-
Donor Sperm Insemination (DSI)	23	26.7
Gestational Carrier (Surrogate) (GS)	40	46.5
Egg donation	48	55.8
Intrauterine Insemination (IUI)	38	44.2
Adoption	86	100

From table 3 above, all of the respondents 100% know that fertility drugs, In Vitro Fertilization (IVF) and adoption are all means of infertility management, in contrast none of the respondents know about the method of Intra Cytoplasmic Sperm Injection (ICSI). However, 6.9% and 9.3% of the respondents know that Zygote Intrafallopian Transfer (ZIFT) and Gamete Intrafallopian Transfer (GIFT) respectively are methods of managing infertility. A total percentage of the couples' knowledge on the management options was calculated to be 38.9%, this indicated a poor knowledge level of couples on the various treatment options in the management of infertility.

IV. DISCUSSION OF RESULT

In terms of marital status, the highest duration of marriage by respondents was 8 – 13 years with a percentage rate of 34.2% and the mean duration of marriage in this study was shown to be 13.2 ± 7.1 . 46.5% of the population was able to achieve 1 pregnancy, while 36.0% were unable to achieve any pregnancy. This indicates that 36.0% of the population suffered from primary infertility which is similar to a study carried out in Sokoto by Panti& Sununu (2014). Out of the 46.5% of the population who had achieved 1 pregnancy, the number of respondents with 1 living child reduced to 44.2%, this indicates that 4.9% of the population had either lost the child during pregnancy, labour, childbirth or infancy. 31.6% of the population had 12 – 17 years duration of infertility which is in contrast with a study carried out by Ekweret. al., (2015). This study also showed that greater percentage 88.4% reported that infertility was not found in the family.

Fifty per cent (50.0%) of the population was aware that infertility is the inability to achieve a pregnancy after 12 months of sexual intercourse, on the other hand, 5.8% of the respondents stated that infertility results when there is an inability to conceive after 6 months of sexual intercourse. However, 13.9% of the respondents agreed that infertility is the absence of conception after 24 months of unprotected sexual intercourse which agrees to the definition by WHO to extend the timeline from 12 to 24 as some couples who are unable to conceive in the first 12 months are able to conceive within 24 months agreeing with a study by Odek et. al., (2014). All of the respondents agreed that infertility can affect both the man and the woman; similarly all respondents agreed that sexually transmitted infections (STIs) can cause infertility, this finding is similar to the study carried out in Iran by Ahmadi&Bamdad, (2017), and however, 79.1% and 76.7% believes that evil spirits and witchcraft/curse can cause infertility respectively in women. Similarly, 73.3% and 77.9% believe that infertility in men can be caused by evil spirits and witchcraft/curse. More than half of the respondents agreed that infertility can be treated. The percentage level of knowledge of the respondents was 83.7%, this indicates that the respondents had good knowledge of infertility, which further implies that awareness programs on infertility were effective.

On the other hand, the percentage level of knowledge of respondents on the management options for infertility showed to be 38.9% which indicated that respondents had a poor knowledge on the management options for the treatment of infertility. However, all respondents 100% were aware that child adoption is a measure to managing infertility; this study is similar to the study carried out by Adewumi et al., (2012). Similarly, all respondents 100% were aware of the use of fertility drugs and In vitro fertilization (IVF) as methods of infertility management. In contrast, 6.9% and 9.3% of the respondents were aware of the methods Zygote Intrafallopian transfer (ZIFT) and Gamete Intrafallopian transfer (GIFT) respectively as methods of infertility management, while none of the respondents were aware that Intracytoplasmic Sperm Injection (ICSI). However, more than half of the respondents 55.8% were aware that egg donation is a method of infertility management.

Implications of findings to Nursing

Improving Knowledge: Nurses are front liners and remain indispensable in the promotion of positive views about issues relating to health in general and infertility in particular. The wrong notion expressed by some respondents in this study is critical and this may influence their attitude to people with infertility. Nurses therefore, are to identify couples with poor knowledge about infertility while conducting comprehensive assessment and interview and target interventions that will help correct these misconceptions or wrong views held by the couples. This study revealed that most couples believe that infertility is not a disease hence it is caused by evil spirits, witchcraft/curse. Nurses can lead change by educating the couples and the populace about the causes and risk factors of infertility. A nationwide campaign aimed at educating the masses on infertility related issues and discouraging stigmatization/discrimination should also be implemented.

Similarly, respondents have poor knowledge on the various methods of management for infertility; hence nurses should carry out awareness programs on the available methods of infertility management to ensure adequate knowledge of infertility management.

V. Summary of the Study

Reproduction/procreation is one of the reasons for marriage, but when couples are unable to procreate it serves as a major concern to them, their family and relatives. This inability makes them sought for help in order to treat their condition. Numerous studies has been done on awareness, knowledge and attitude of individuals to infertility but little or no study has been carried out to assess the knowledge of couples on the management options available to couples who may seek medical attention regarding infertility in Port Harcourt, Rivers State.

This study employed a descriptive cross-sectional method to assess the knowledge of infertility and management options available to couples attending the Obio Cottage Hospital (OCH) Port Harcourt, Rivers State. The respondents had good knowledge of infertility with a percentage level of knowledge of 83.7%. Respondents also exhibited a good knowledge on In Vitro Fertilization (IVF), fertility drugs and child adoption as methods of infertility management, however, respondents showed a poor knowledge level on the other methods of management for infertility. This reveals that couples are not aware that there are other management options in the treatment of infertility. Nurses should work with the obstetricians and gynecologists in order to health educate the public on the different methods of infertility management. Nurses are closer to the patients and the community at large, hence they are in better positions to give adequate information on infertility and advocate for couples who may be faced with this challenge, including giving them psychological support, reducing negative attitudes from the relations and other members of the public, so as to render holistic care for the couples.

VI. Conclusion

The study showed a good percentage of knowledge on infertility but a relatively low percentage of knowledge on the different management options for infertility.

REFERENCES

- [1]. Abiodun, O. M., Balogun, O. R. and Fawole, A. A. (2007). Aetiology, clinical features and treatment outcome of intrauterine adhesion in Ilorin, Central Nigeria. *West Afr J Med*; 26:298-301.
- [2]. Achmad K. H., Victor P. A. & Stephanie W. A. (2019). Discrepancy in perception of infertility and attitude towards treatment options: Indonesian urban and rural area. *Harzif et al. Reproductive Health*.16:126 <https://doi.org/10.1186/s12978-019-0792->
- [3]. Adewumi, A., Etti, E., Tayo, A., Rabi, K., Akindele, R., Ottun, T., & Akinlusi, F. (2012). Factors associated with acceptability of child adoption as a management option for infertility among women in a developing country. *International Journal of Women's Health*.
- [4]. Adexen. (2021). Obio Cottage Hospital (OCH).
- [5]. Adeyemi, A. S., Adekanle, D.A. and Afolabi, A. F. (2009). Pattern of gynaecological consultations at Ladoké Akintola University of Technology Teaching Hospital. *Niger J Clin Pract*. 12: 47-50.
- [6]. Ahmadi, A. & Bamdad, S. (2017): Assisted reproductive technologies and the Iranian community attitude towards infertility; *Human Fertility*. DOI: 10.1080/14647273.2017.1285057
- [7]. Akande, S.O., Dipeolu I.O. & Ajuwon A.J. (2019). Attitude and willingness of infertile persons towards the uptake of assisted reproductive technologies in Ibadan, Nigeria. *Ann Ibd. Med*; 17(1):51-58
- [8]. Akinloye, O. and Truter, E. J. (2011). A review of management of infertility in Nigeria: framing the ethics of a national health policy. *International Journal of Women's Health*; 3 265–275
- [9]. Ali, S., Sophie, R., Imam, A. M., Khan, F. I., Ali, S. F., Shaikh, A and Farid-ul-Hasnain, S. (2011). Knowledge, perceptions and myths regarding infertility among selected adult population in Pakistan: a cross-sectional study. *BMC Public Health*.11:760
- [10]. Animasahun, V. J., Tijani, A. M., Amoran, O. E., Oyelekan, A. A. and Sholeye, O. O. (2013). Contraception and infertility among couples in Sagamu Local Government Area, South-West, Nigeria. *International Journal of Scientific Study*; 1(3): 39 -45
- [11]. Aziken, M. E., Orheu, A. A. E., Kalu, O. O and Osemwemkha, P. A. (2010). Knowledge, perception and attitude of infertile women in Benin City, Nigeria to the causation of infertility and in vitro fertilization and embryo transfer. *Tropical Journal of Obstetrics and Gynaecology*.27(2)
- [12]. Calogero, A., Polosa, R., Perdichizzi, A., Guarino, F., La Vignera, S., Scarfia, A., et. al. (2009). Cigarette smoke extract immobilizes human spermatozoa and induces sperm apoptosis. *Reprod Biomed Online*;19:564-71.
- [13]. Copen, C. E. and Stephen, E. H. (2013). Infertility and impaired fecundity in the United States, 1982-2010: Data from the National Survey of Family Growth. *Natl Health Stat Report*;67:1-18.
- [14]. Damani, M. N. and Shaban, S. F. (2008). Medical treatment of male infertility. *Glob Libr Women's Med*; Ebook (ISSN:1756-2228). [DOI 10.3843/ GLOWN. 10334].
- [15]. Ekwere, P.D., Archibong, E.L, Bassey, E.E., Ekabua, J.E., Ekanem, E.I. and Feyi-Waboso P. (2015). Infertility among Nigerian couples as seen in Calabar. *Port Harcourt Medical Journal*;2:35-40
- [16]. Gore, A. C., Chappell, V. A., Fenton, S. A., et. al. (2015). The endocrine society's second scientific statement on endocrine-disrupting chemicals. *Endocrine Reviews*; 15; 36(6): E1-E50. doi: 10.1210/er.2015-1010
- [17]. Ghadir, S., Ambartsumyan, G. and DeCherney, A. H. Infertility. In: DeCherney, A. H., Nathan, L., Laufer, N., Roman, A. S. (2013). *Current diagnosis and treatment: obstetrics & gynecology*. 11th ed. New York: McGraw-Hill
- [18]. Iruo, L.A., Ene- Peter, J., Okolo, S. O. (2021). Correlations between anxiety, depression and academic achievements among students in a nursing programme in south- south Nigeria. *International journal of innovative science and research technology* 6(9)1-19
- [19]. Jumayev, I., Rashid, M. H., Rustamov, O., Zakirova, N., Kasuya, H. and Sakamoto, J. (2012). Social correlates of female infertility in Uzbekistan. *Nagoya J. Med. Sci.*; 74: 273 – 83.
- [20]. Jungwirth, A., Diemer, T., Dohle, G. R., Giwercman, A., Zopa, Z., Krausz, H., et. al. (2012). Guidelines for the investigation and treatment of male infertility. *Eur Urol*;61:159-63.

- [21]. Kimberly, L., Case, A., Cheung, A. P., Sierra, S., AlAsiri, S., Carranza-Mamane, B., et. al. (2012). Advanced reproductive age and fertility. *Int J Gynaecol Obstet*;117:95-102.
- [22]. Obuna J. A., Ndukwe E. O., Ugboma H. A., Ejikeme B. N., Ugboma E. W. (2012). Clinical presentation of infertility in an outpatient clinic of a resource poor setting, South East Nigeria. *Int J Trop Disease and Health*. 2:123-31.
- [23]. Odek, A. W. Masinde, J. and Egesah, O. (2014). The predisposing factors, consequences and coping strategies of infertility in males and females in Kisumu district, Kenya. *European Scientific Journal*; 415-426
- [24]. Okonofua, F. E. Infertility in Sub-Saharan Africa. In: Okonofua, F. E. and Odunsi, K., editors. *Contemporary obstetrics and gynaecology for developing countries*. Publishers: Women's Health and Action Research Center. Benin City: 2003. p. 128-56.
- [25]. Owolabi, A. T. Fasubaa, O. B. and Ogunniyi, S. O. (2013). Semen quality of male partners of infertile couples in Ile-Ife, Nigeria. *Nigerian Journal of Clinical Practice*; 16(1)37: 37-40
- [26]. Panti, A. A. and Sununu, Y. T. (2014). The profile of infertility in a teaching Hospital in North West Nigeria. *Sahel Medical Journal*; 17(1): 7-11
- [27]. Safarinejad, M. R. (2008). Infertility among couples in a population-based study in Iran: prevalence and associated risk factors. *Int J Androl*; 31(3):303-14.
- [28]. Schanz, S., Reimer, T., Eichner, M., et. al. (2011). Long-term life and partnership satisfaction in infertile patients: A 5-year longitudinal study. *FertilSteril*; 96:416-421.
- [29]. Sharma, R., Biedenharn, K. R., Fedor, J. M. and Agarwal, A. (2013). Lifestyle factors and reproductive health: Taking control of your fertility. *ReprodBiol Endocrinol*;11:66.
- [30]. Stewart, A. F. and Kim, E. D. (2011). Fertility concerns for the aging male. *Urology*;78:496-9.
- [31]. Sule, J.O., Erigbali, P. and Eruom, L. (2008). Prevalence of Infertility in Women in a Southwestern Nigerian Community. *African Journal of Biomedical Research*; 11: 225 – 227
- [32]. Sultana, A., Tanira, S., Adhikary, S., Keya, K. A. and Akhter, S. (2014). Explained infertility among the couple attending the infertility unit of Bangabandhu Sheikh Mujib Medical University (BSMMU), Bangladesh. *J Dhaka Med Coll*; 23(1): 114-20.
- [33]. Sundby, J., Schmidt, L., Heldaas, K., et. al., (2007). Consequences of IVF among women: 10 years post-treatment. *J PsychosomObstet Gynaecol*;28:115-120.
- [34]. Uadia, P. O. Emokpae, A. M. (2015). Male infertility in Nigeria: A neglected reproductive health issue requiring attention. *Journal of Basic and Clinical Reproductive Sciences*; 4(2): 45-53
- [35]. Umeora, O. U., Mbazor, J. O. and Okpere, E. E. (2007). Tubal factor infertility in Benin City, Nigeria - sociodemographics of patients and aetiopathogenic factors. *Trop Doct.*; 37(2):92-4.
- [36]. WHO (2013). *Sexual and reproductive health*. WHO, Geneva. Available at <http://www.who.int/reproductivehealth/news/en/> accessed 5 September, 2013.
- [37]. World Health Organization (WHO), (2010). *Mother or nothing: The agony of infertility*. WHO Bulletin 2010;88:877-953
- [38]. World Health Organization (WHO), (2018). *International classification of diseases, 11th revision (ICD-11)* Geneva.
- [39]. Yamene, T. (1973). *Statistics; an introductory analysis (18th edition)*: Haper and Row.