Prevalence and Factors associated with Female Sexual Dysfunction amongst Women using Hormonal and Non-Hormonal Contraception at The Aga Khan University Hospital Nairobi Clinics

Momin Butt
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PREVALENCE AND FACTORS ASSOCIATED WITH FEMALE SEXUAL DYSFUNCTION AMONGST WOMEN USING HORMONAL AND NON-HORMONAL CONTRACEPTION AT THE AGA KHAN UNIVERSITY HOSPITAL NAIROBI CLINICS

By

DR. MOMIN RIZWAN BUTT

A dissertation submitted in part fulfillment of the requirements for the degree of Master of Medicine In Family Medicine

Nairobi, Kenya

08/06/2018
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In part fulfillment of the requirements for the degree of
Master of Medicine
In Family Medicine

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Chair, Dissertations Standard Committee
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Date
DEDICATION

To Family, the purest form of love ever!
ABSTRACT

Background
Female sexual function is a complex phenomenon. It integrates all the body systems and is influenced by a variety of factors. Contraceptives have been shown to have variable effects on female sexual function, but there have not been adequately powered studies on this in our setting.

Justification
The prevalence of female sexual dysfunction (FSD) has been shown to vary among different population subsets globally. The associations of different factors with FSD have also shown variable conclusions that are not generalizable to our setting. In Kenya there is a high discontinuation rate of contraception and this is mainly attributed to its related side effects. This has created a need to study the prevalence of, and the significant factors affecting FSD among those using contraception in our setting.

Objectives and methods
The aim of the study was to determine the prevalence of FSD among women using hormonal and those using non-hormonal contraception and to examine the factors associated with it. A cross-sectional study was conducted at clinics within AKUHN. Consecutive sampling of women of reproductive age using either hormonal or non-hormonal contraception was done. Two questionnaires, one on demographic profiles and the other on the female sexual function index (FSFI) were completed.

Independent associations of the factors with the outcome variables were assessed using Chi square test of association and variables with a P< 0.25 used in the multivariate analysis. Factors associated with FSD were determined using binary logistic regression.

Results
A total of 566 participants were included. The prevalence of FSD among those using hormonal and those using non-hormonal contraception was 51.5% and 29.6% respectively (P<0.0001). Using logistic regression we found that the factors that were associated with FSD were presence of chronic illness and use of chronic medication, self-employment and unemployment statuses, alcohol intake and history of miscarriage(s).

Conclusions and recommendations
There was a high prevalence of FSD in our setting. There was a strong association between hormonal contraception and FSD amongst those using it. More studies on this topic in different settings are recommended to investigate effect of each type of hormonal method on FSD.
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<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AKUHN:</td>
<td>Aga Khan University Hospital Nairobi</td>
</tr>
<tr>
<td>DSM-5:</td>
<td>Diagnostic &amp; Statistical Manual of Mental Disorders 5th Edition</td>
</tr>
<tr>
<td>FMC:</td>
<td>Family medicine clinic</td>
</tr>
<tr>
<td>FSD:</td>
<td>Female Sexual Dysfunction</td>
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<td>FSFI:</td>
<td>Female sexual function index (FSFI)</td>
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<tr>
<td>FVSC:</td>
<td>Female Voluntary Surgical Contraception</td>
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<tr>
<td>GOPC:</td>
<td>Gynecology outpatient clinic</td>
</tr>
<tr>
<td>IUD:</td>
<td>Intra Uterine Device</td>
</tr>
<tr>
<td>KDHS:</td>
<td>Kenya demographic health survey</td>
</tr>
<tr>
<td>LAM:</td>
<td>Lactational Amenorrhea Method</td>
</tr>
<tr>
<td>NHSLS:</td>
<td>National Health and social life survey</td>
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<tr>
<td>QoL:</td>
<td>Quality of life</td>
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<tr>
<td>SD:</td>
<td>Sexual Dysfunction</td>
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<tr>
<td>SHBG:</td>
<td>Sex Hormone Binding Globulin</td>
</tr>
<tr>
<td>SNRIs:</td>
<td>Serotonin- norepinephrine reuptake inhibitors</td>
</tr>
<tr>
<td>SSRIs:</td>
<td>Selective serotonin reuptake inhibitors</td>
</tr>
<tr>
<td>WHO:</td>
<td>World Health Organization</td>
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I also want to acknowledge my wife Arsh Pervez for her support throughout the period of this thesis preparation.

Thank you all
DECLARATION

I declare this dissertation does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university and that to the best of my knowledge it does not contain any material previously published or written by another person except where due reference have been made in the text.

______________________________
(Signature of candidate)

08/06/2018

Date
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INTRODUCTION

Sexual function is an important component of sexual health which determines general well-being of a person. Female sexual dysfunction (FSD) is the persistent or recurring decrease in sexual desire, arousal, presence of dyspareunia and difficulty in or inability in achieving orgasm that is sufficient enough to cause personal distress (1). The four main types of FSD as described by the Diagnostic and Statistical Manual of Mental Disorders, 5th ed. (DSM-5) are sexual arousal disorders, substance or medication induced disorders, orgasmic disorders and genito-pelvic pain /penetration disorders (2).

FSD is a common problem globally with an estimated prevalence ranging from 19%-78% in different parts of the world (3-6). This variation in prevalence is possibly due to differences in population characteristics such as community vs hospital or institution based samples (3). A recent local study by Oindi et al in 2017 at The Aga Khan University Hospital (AKUHN), on women seeking fertility services reported an overall sexual dysfunction prevalence of 27%.

The risk factors for FSD have been highlighted in literature (7, 8). These have been broadly divided into five main groups which include biological factors such as hormonal status which can be influenced by the use of hormonal contraception, demographic factors such as age and education levels, psychological factors including mental health conditions such as anxiety and depression, sociocultural factors such as religion and traditional customs and finally the pathophysiological factors which are complications of chronic conditions such as diabetes mellitus and rheumatoid arthritis (9-13).

Contraception is the use of any method or device to delay or prevent pregnancy (14, 15). Both hormonal and non-hormonal methods of contraception have been shown to have an effect on female sexual function. A review of empirical literature suggests that the effect of contraception can either be positive and negative (9). Similarly, studies examining the effect of the different factors on sexual function also show both positive and negative effects in different settings (4, 5, 16-18).

The current contraceptive prevalence rate in Kenya is 58%, with the majority of women using hormonal methods. A significant proportion (31%) of the users discontinue use within one year of starting due to side effects of the contraceptive methods (19).

Sexuality is a taboo subject in many societies and women and physicians do not routinely discuss effects of contraception on sexual health (20, 21).

It was therefore important to examine the effect of hormonal contraception on FSD in order to have contextually relevant information for women seeking to be on or already on contraception due to high numbers of women already using hormonal contraception methods.
This study aimed to compare the prevalence of sexual dysfunction in women attending AKUHN clinics using hormonal to those using non-hormonal contraception, to determine and examine the other risk factors associated with FSD.
DEFINITIONS FOR THIS STUDY

The hormonal contraceptive methods in this study included: Injectable contraceptive such as medroxyprogesterone acetate; oral contraceptives such as progestin only and combined oral contraceptive pill; transdermal patches containing ethinylestradiol and norelgestromin; implants such as levonorgestrel; vaginal rings containing etonogestrel and ethinylestradiol; and levonorgestrel intra uterine system commonly referred to as the hormonal intrauterine device (IUD).

The non-hormonal methods of contraception included: male and female condoms, male and female sterilization methods (tubal ligation and vasectomy), copper IUDs; natural methods such as the calendar / rhythm method and coitus interruptus; lactational amenorrhea method (LAM), use of spermicides and vaginal douching.

The above methods were chosen as they were found to be the easily available methods in Kenya (19).
LITERATURE REVIEW

Physiology of sexual functioning

Normal sexual functioning is dependent on the sequence of stages the body undergoes during the sexual response. The human sexual response has been a widely studied field mainly by use of theoretical frameworks in order to understand the female sexual response and to help with ascertaining the mechanisms of dysfunction. In 1966 Masters and Johnson (22) provided the initial insights into the sexual response. They described a linear process of the stages consisting of excitement, arousal, orgasm, and resolution, mainly focusing on the physical response of the genitalia (22). In 1979, Kaplan (23) noted in her practice that a key aspect in initiating the sexual response was desire and came up with a model of three main phases: desire, arousal, and orgasm (23).

Basson (24), suggested a different (nonlinear) female sexual response model. This circular model had several deviations from the previously described ones. One such change was that the starting point of the female sexual response cycle is not necessarily spontaneous desire, but rather could be the result of intimate feelings with her partner which could initiate the sexual response cycle. She also emphasized the fact that sexual stimuli often precede sexual desire and arousal and that the two can also occur together. The new model also addresses that better relational factors and emotional receptivity results in higher satisfaction and better outcome of sexual response in future (25).

The Diagnostic and Statistical Manual of Mental Disorders, 5th ed. (DSM-5), categorizes sexual dysfunctions into clusters of heterogeneous disorders that are characterized by a clinically significant disability in a person’s sexual response to experience sexual pleasure. These are divided into four main groups (2).

1. Sexual interest/- arousal disorders: in which the main finding is reduced or absent sexual fantasies and/- or desire for sexual activity with persistent or recurrent inability to attain, or to maintain until completion of the sexual activity, adequate lubrication and swelling in response to sexual excitement. This disorder is commonly seen in women suffering from depression and other psychological problems, (26, 27), and in women older than 50 years of age. It is also associated with lower levels of education(27) and use of certain medications like selective serotonin reuptake inhibitors (SSRIs) and serotonin-norepinephrine reuptake inhibitors (SNRIs) (28, 29).
2. Substance/- Medication induced sexual dysfunction. This has mostly been attributed to medications which have central nervous system inhibition as their mechanism of action. Medications in this category include: antihypertensives such as clonidine and methyldopa, antipsychotics like haloperidol, and antihistamines (30). Long-term recreational drug abuse of substances like alcohol, hallucinogens, and narcotics is also associated with lower sexual satisfaction levels (31).

3. Orgasmic disorders: a persistent or recurrent delay in, or absence of, orgasm after a phase of normal sexual excitement. These have been noted to be more prevalent in older women (age more than 40), those with chronic illnesses, psychological problems and lower education levels (27). Both medications and drugs of abuse have also been implicated in developing orgasmic dysfunction and lower libido in women. The common ones include anti-epileptics such as topiramate and gabapentin and long-acting gonadotrophin-releasing hormone agonist used for breast cancer (31, 32).

4. Genito-Pelvic pain / Penetration disorders: This mainly includes dyspareunia and vaginismus. Those afflicted by these disorders mostly include women younger than 30 years, those with chronic illness and lower levels of education (27). Certain hormonal contraceptives like depot medroxyprogesterone acetate can cause vaginal atrophy and consequent dyspareunia and sexual dysfunction in women (33).

For a diagnosis of any of the above disorders, the symptoms must be present for at least six months, must cause clinically significant distress in the individual and cannot be better explained by any other stressor such as a relationship problem (2).

The factors associated with FSD

Sexual health and its associated factors is an understudied subject in sub Saharan Africa. The impact of bio-physiological and hormonal factors in our setting is yet to be determined. This is probably due to the long prevailing burden of infectious diseases and rapidly growing burden of non-communicable diseases in Africa. This has led to more neglect of explorations in the field of sexual health in Africa than anywhere else (16, 17).

The factors that influence female sexual function are mainly classified into but not limited to five main groups namely: demographic factors, pathophysiological factors, psychological factors, sociocultural factors and biologic factors. This has also been illustrated by Rosen et al (8) and Althof et al (7) in the form of the bio psychosocial model FSD.
1. Demographic factors- Include aspects like age, parity, and level of education. Sexual function of women is reported to decrease with increasing age of self and increasing age of the partner (34, 35). According to some studies women with higher levels of education, and those who are employed or are financially independent express higher levels of sexual satisfaction than those with lower education levels and stay at home mothers but other studies with completely opposite conclusions that have also been reported and hence no consensus has been reached (34).

Increasing age, lower levels of education and higher parity were also noted to be significant in a cross-sectional study carried out by Singh et al in a tertiary care hospital in India (4). Studies done both in developed and less developed countries have shown similar results as described above. These studies include a cross-sectional survey on prevalence and risk factors of FSD in Turkey in 2004 (18), a health screening project of 703 healthy women in Austria by Ponholzer et al in 2005 (5) and an urban Chinese population-based survey done by Parish et al in 2007 (36).

The complexity and inter-dependence aspect of these factors’ influence can be seen in a cross-sectional Nigerian study done in the Osun state, which concluded that younger women and those of higher education levels were more likely to report sexual dysfunction. This was attributed to the overlapping psychosexual factors that were seen more in the younger population of Nigeria which include male dominance in the economic sector, fear of rejection or divorce if sexual dissatisfaction is mentioned, burden of domestic duties on the women, and being in a polygamous union which is common in Nigeria (37).
Parity has also been shown to have an inverse effect on the levels of sexual satisfaction in women, with lower levels of satisfaction reported in women with two or more children as compared with nulliparous women in many studies (15, 34, 38). The opposite of this finding was noted in a 2017 study of Indonesian Women. In this study Wulandari et al found that high parity was associated with better sexual quality of life in women (39).

A recent study done in 2016 by Maseroli et al in Italy showed lower sexual function scores for women with older partners (40). The effect of the male partner’s age and the age gap between the two also has direct influence on the women’s sexual satisfaction with better sexual function reported if the difference is less than 10 years (41).

Majority of the participants in the present study belonged to the African race. In 2010 Huang et al in a cross-sectional cohort study done in USA reported that Black and Latino women had higher levels of sexual functioning than Caucasian and Asian women (42). In another similar type of study done in 2015, Hughes et al reported opposite findings in which Caucasian and African American women had higher levels of sexual functioning than the women of other ethnicities (42, 43).

2. Pathophysiological factors- these mainly include the effects of chronic diseases on sexual satisfaction. Some of the common conditions that have been examined for associations with sexual dysfunction are diabetes mellitus, rheumatoid arthritis and HIV/AIDS. A case control study done by Enzlin P et al showed that sexual dysfunction was a common problem in women with diabetes (prevalence of 27% vs 15% in the age matched control group) and caused reduction in libido and vaginal lubrication leading to reduced sexual satisfaction (11, 44).

Lema (2015) published a case report on HIV/AIDS and its association with sexual dysfunction that highlighted possible interactions between pathophysiological and psychological aspects of the illness (45). A case control study conducted by Abda E et al in Egypt showed a prevalence of sexual dysfunction of 4%-78% in a hospital based population with rheumatoid arthritis compared with 3% to 20% in the control group varying with age, duration of rheumatoid arthritis and degree of disability (11, 46).

3. Psychological factors- Mental health has been identified as one of the most significant factors affecting sexual health and has already proven to be having a significant effect on sexual satisfaction (47-49). Mental health manifests as a wide array of conditions like anxiety disorders, low self-esteem, depressive disorders and psychotic disorders (11). This factor was not examined in this study. A 2008 study by Hayes et al showed that dissatisfaction with a relationship and poor relationship status was more often seen in a
women with sexual arousal disorder and that sexual distress was associated with both psychological and relationship factors \((50)\). Being a victim of sexual abuse as a child or adolescent had a definite negative spillover effect on sexual function in adulthood. Other factors such as emotional trauma from previous abortions and family issues such as pressure from the in-laws to conceive for those women living in extended families has also been noted to affect sexual function \((51, 52)\).

4. Sociocultural factors- This encompasses a wide range of factors from local and traditional cultural practices with regards to sexuality, which involves the role of women in the sexual act. Different societies and religions appreciate the understanding of sexuality and its importance for women’s health differently \((53)\). There are a number of practices which pose ethical dilemmas to physicians including female genital mutilation (FGM) and genital cosmetic surgeries. Largely what can be derived from the studies that look at sociocultural factors are recommendations that clinicians should be informed by to develop culturally sensitive skill sets to deal with the stigma that may arise with the diagnosis of sexual dysfunction \((54)\).

The effect of smoking on FSD is largely influenced by societal and cultural norms. Two studies done around the same period of time in different regions by Yilmaz et al \((18)\) in Turkey and Costa RM et al in Portugal in 2015 \((55)\) stated contradictory results about the effect of smoking on FSD. The Turkish study showed that smoking could negatively affect sexual function by disrupting biologic mechanisms of vasculature, whereas the Portuguese study concluded that moderate tobacco use was associated with higher sexual desire. In Ghana, a cross-sectional study was done by Amidu N et al to explore risk factors contributing towards developing FSD. This revealed alcohol to be the only significant factor among a total of six factors studied \((6)\).

Religious beliefs and influences play an important role in sexuality, encompassing concepts of sexual guilt and shame \((56)\). They may cause a woman to acquire only a limited amount of information on her sexuality that could influence sexual function in either a positive or negative way. However the extent to which religion affects sexual function has not been defined \((56, 57)\).

5. Biological factors – These are influences on an individual’s sexual health that are rarely seen as a solitary factor. They are usually part of an overlapping pattern of the factors mentioned above and may act as predisposing, precipitating, or maintaining factors. They are mostly dependent on the individual’s medical history, psychosocial history and stage of life of the person e.g. pre, peri or post-menopausal status. It encompasses wide variety of factors such as presence or absence of endocrine disorders, hormonal status and therapy (including contraception), genetic conditions and residual conditions like pain associated with dysmenorrhea or endometriosis \((58)\).
Hormonal contraception has been stipulated to cause sexual dysfunction in women mainly causing problems in the arousal phase. It is associated with increased sexual pain, decreased sexual pleasure and anorgasmia. This has been associated with two proposed theories associated with a decreased androgen levels in circulation caused by hormonal contraceptives (59). Firstly hormonal components of oral contraceptives increases sex hormone-binding globulin (SHBG) thereby decreasing free testosterone and secondly oral hormonal contraceptives suppress androgen production from the ovary, and this effect is made worse if the hormonal contraceptive contains an anti-androgenic progestin (59, 60).

**Contraception and FSD**

In 2015, 64% of women who were married or in a relationship were using some form of contraception globally (61). In Kenya the figure was 58% of which 44% were on hormonal methods (19). The annual default rate of women using any form of contraception stands at 31% and this has mainly been attributed to concerns of side effects and general health issues (19, 61). In Kenya the most common modern preparations of hormonal contraceptives available in the market included injectable progesterone (Depo Provera being the most readily available), combined oral contraceptives which contain oestrogen and progestin and progestin only pills with the former being more commonly used than the latter. Norplant (implant) containing levonorgestrel coated rods, is the third most commonly used contraceptive followed by emergency contraceptives and levonorgestrel- releasing coil (Mirena).

Among the non-hormonal methods the copper bearing intra uterine contraceptive device copper T380A, female voluntary surgical contraception (FVSC), barrier methods (male and female condoms), male sterilization and use of vaginal spermicides are used in decreasing frequencies in Kenya (19).

The effect of contraception on sexual dysfunction has been seen to have conflicting results. Comparison studies on the effect of contraception on sexual functioning amongst women using hormonal and non-hormonal methods have not reached a consensus on which type has more detrimental effects on sexual function. A study by Davison et al (2008) showed hormonal contraceptive methods to have more detrimental effects on sexual function as compared to non-hormonal methods of contraception (62). Similar findings were noted by Safarinejad M et al (2006) in Iran (27) and Wallwiener (2015) in a cohort involving female medical students in Germany, Austria and Switzerland (63). Contrary findings have been noted in other studies. In a prospective study conducted by Guida et al (2014) in Italy, women using hormonal contraception reported an increase in positive indicators of sexual functioning as compared to those using non-hormonal methods (10). Similar findings were also seen in a study done by Higgins et al in USA in 2016 (64).
The effects of both hormonal and non-hormonal contraception have unpredictable overall effect on female sexual function. The overall effect on FSD is an interplay of the influence of all factors of the biopsychosocial model such as age, education levels and religious and cultural backgrounds which is unique to every society (4, 11, 65). This made it important to examine the effect of the locally prevalent factors which may differ in strength and direction of interplay.

**Prevalence of FSD**

The incidence of FSD has been shown to vary widely (3). There are very few studies on this subject from sub-Saharan Africa.

A true population based study on a representative sample in the USA on subjects aged 18-59 years by the national health and social life survey (NHSLS) reported an overall prevalence of 43% at that point in time (66).

A prospective cross sectional survey by Amidu et al in 2011 in Ghana showed a prevalence of 73% among healthy females between the ages of 18-58 years (6). In a larger but similar type of study of (n=2626) in Iran, Safarinejad et al found a prevalence of 32%. Twenty two percent of the women with SD in this study were using a form of contraception (27). In another population based epidemiological study done in Morocco, the prevalence of sexual dysfunction was found to be 27% which compares to the findings of a local study by Oindi et al in 2017 which showed an overall prevalence of FSD of 27% in women seeking fertility services and those in a control group. As part of secondary analysis among those using contraception, the prevalence of SD in the hormonal group was 40% and non-hormonal 14% with odds ratio of 4 (CI 1.38-11.62) which was statistically significant.

**Quantifying FSD**

The need for quantifying FSD has led to development of many tools, some of which have been used in different types of studies. Of these the most suitable for this study is the Female sexual function index (FSFI) which has had extensive studies on validity and reliability testing.

This is a 19 item questionnaire which was developed as a brief, multidimensional self-report tool to assess the important aspects of sexual function in women. It is a generally well accepted tool and has been used in several studies across the world. It is easier to administer than most in terms of simplicity. It has also been tested for validity and inter-rater cross-reliability (67). In the year 2000, M. Wiegel et al conducted a review of the available validated tools for assessing female sexual function. They studied 259 women recruited in 5 research centers in the USA to establish the reliability and validity of FSFI. It is the only instrument that has been validated and tested on a sample of women with clinically diagnosed sexual dysfunction. It has been used to diagnose FSD in both clinical and non-clinical samples and noted to be psychometrically sound, and is easy to administer and can easily distinguish between clinical and non-clinical populations (67). Similarly Daker-White G carried out a systematic review on reliability and validity of self-report measures
of sexual function. 24 questionnaires were identified of which 14 were found to have met minimum or above standard reliability and validity measures and only 2 met superior psychometric standards of which FSFI was one of them. The FSFI was found to better suited for clinical measurement and to be more focused on individual function (68).

In our local setting, the FSFI has been used in a study done by Oindi et al (2017) and no unforeseen difficulties were encountered in its administration or its ability to diagnose and score sexual dysfunction.
JUSTIFICATION FOR THE STUDY

Hormonal contraception remains a major method of family planning globally. The majority of women who are considered suitable for or choose hormonal contraception are young women and at the peak of sexual life. They want to continue enjoying sexual relationships without the risks of pregnancy.

Hormonal contraception is not without potential side effects including those on women’s sexual function and studies on contraception in our setup show a low prevalence, with a large unmet need and high contraceptive discontinuation rates at 12 months. This has largely been attributed to fears of side effects such as weight gain and loss of libido as reported in the Kenya demographic and health survey (2014).

FSD has been shown to be a common problem among women worldwide for which there are various attributing factors. The prevalence of FSD and the factors associated with it have mostly been studied in socio-cultural backgrounds that are different from ours. The present studies mostly target these factors as secondary objectives as seen in the systematic reviews, and currently no meta-analysis for this subject exist. Hence the conclusions of these studies are not generalizable. This made it important to have clear associations of the effect of contraception on sexual health in our set up.

This study aimed at determining the prevalence of sexual dysfunction in women using contraception, to look at the association of hormonal contraception with FSD and to examine the socio demographic factors that were associated with FSD at AKUHN.
RESEARCH QUESTION

Is there a significant difference in the prevalence of and factors associated with sexual dysfunction in women using hormonal and those using non-hormonal contraception at the AKUHN clinics?
OBJECTIVES

Primary Objective

To determine the prevalence of sexual dysfunction in women who were using hormonal and non-hormonal contraception at the AKUHN clinics.

Secondary Objective

To examine the significant socio demographic factors that are associated with sexual dysfunction in women using contraception at AKUHN clinics.
OUTCOME MEASURES:

The primary outcome was the prevalence of FSD. This was defined as the proportion of the women with SD in the population of all women interviewed, stratified by type of contraceptive used (hormonal and non-hormonal). The prevalence was defined by categorizing the scores of the FSFI questionnaire as those below the defined cut-off levels to have SD and those with scores above the cut-off level to not. The secondary outcome was the associations of the different factors that affect FSD, highlighted in the demographic questionnaire and elaborated in a logistic regression model.
METHODOLOGY

Study Design
This was a cross-sectional analytical study. Women of reproductive age were sampled at a point in time during visits to gynaecology outpatient clinic, family medicine clinic and family planning clinics.

Study setting
The study was carried out at The Aga Khan University Hospital which is a tertiary care referral hospital which generally serves a wide variety of individuals with different social and demographic characteristics. The clinics identified to be used for the study were; the family planning clinic which ran on Tuesday between 2pm to 5pm, Family Medicine Clinic (FMC) which ran Monday to Friday between 9am to 5pm and Gynecology outpatient clinic (GOPC) which ran between 9am to 5pm on Monday through to Friday and 9am to 1pm on Saturday.

Study participants
The cohort studied were women of reproductive age (18 to 49 years) who were using any form of contraception. Participants who were eligible and gave informed consent were recruited.

Inclusion criteria:
Women between the ages of 18 to 49 years who attended the AKUHN clinics, and could read and write in English. This was mainly because the study questionnaire has not been validated in Kiswahili or any other local language from our setup. They had to also be sexually active and in a heterosexual relationship for the past four weeks of participating in the study. The participants had to be using any type of contraception, particularly only one type of contraception for the past six months.

Exclusion criteria:
Women who had a known psychiatric illness and history of sexual dysfunction were excluded from the study. Also, the participants who had undergone pelvic floor surgery had chronic pelvic pain syndromes or histories of any gynecological malignancies were excluded as these conditions are known to have a negative influence on sexual function. Women who had switched from one type of contraception to another in the past six months were also excluded as this is the duration beyond which, according to the DSM-5, a diagnosis of sexual dysfunction can be made from persistence of particular symptoms.
Sampling:

Sample size calculation

The formula used for sample size determination was that for comparison of proportions between two groups:

$$n = \frac{[p_1(1-p_1) + p_2(1-p_2)]}{(p_1 - p_2)^2} \times c_{p\text{.power}}$$

Where $n$= Sample size

$P_1$ is the prevalence of sexual dysfunction in proportion one and $P_2$ is the prevalence of sexual dysfunction in proportion two. The power of the study was set at 80%. The value of $\alpha$ was set at 0.05 (95%). The $C_{p\text{.power}}$ was 7.9. Using the 2017 study by Oindi et al, highlighted above in the literature review section the prevalence they obtained from their study was used for calculating sample size where: $P_1$ was the prevalence of sexual dysfunction in the group of women in the study who were using non-hormonal contraception. We aimed to detect at least a 10% difference ($P_1=27\%$) (Oindi et al 2017) in proportion with FSD in this group. A 10% difference in prevalence of FSD between the two groups was thought to be clinically significant. $P_2$ was the prevalence of Sexual Dysfunction in the cohort of women attending AKUHN clinics using hormonal contraception reported as 37%. The calculations using the above formula for comparison of proportions gave a sample size of 283 women in each arm. This was then multiplied by two to get a total sample size of 566 women.
Data collection procedure and tools

Consecutive sampling technique was used to recruit participants from the clinics until the required sample size was achieved.

Women attending the above named clinics who were in the specified age category were approached by the triage nurse. The eligibility of the subjects was confirmed using a set of 3 oral questions about their age, whether they spoke English and if they were using anything to prevent them from getting pregnant. The eligible women who agreed to participate in the study were given two questionnaires: the demographic questionnaire and FSFI to be filled in a separate private room. The participants were asked to drop them in a sealed box at the triage station after they had filled them.

A two-part questionnaire was used to collect the data. The first part was asking about socio demographic information and the second part entailed sexual function in women.

The socio demographic questionnaire collected information on: age of subject, age of partner, parity, race, marital status, religion, alcohol intake, smoking status, employment status, presence of chronic illnesses e.g. hypertension, diabetes mellitus and rheumatoid arthritis, and type of contraception that was currently being used (hormonal and non-hormonal).

The Female Sexual Function Index questionnaire was used to collect information on the outcome variable. This tool assessed six aspects—the four major aspects of the sexual physiology, that is, desire, arousal, orgasm and pain disorder and the quality of vaginal lubrication and the subject’s satisfaction with the sexual relationship and global sexual satisfaction in the past four weeks. The features examined in desire domain include: frequency of desiring intercourse, level of desire of intercourse, satisfaction and confidence with performing intercourse. The arousal domain included: frequency of successful intercourse and difficulty in getting aroused for intercourse. The lubrication domain included: frequency of maintaining and difficulty in maintaining lubrication. The pain domain assesses: frequency of pain during vaginal penetration, frequency following vaginal penetration and level of pain during and following vaginal penetration. The satisfaction domain mainly assessed factors like satisfaction with the amount of closeness with the sexual partner, satisfaction with the sexual relationship and generally, the satisfaction with one’s sexual life.

A study poster was also used as a visual aid and was placed in strategic positions within the study sites to help achieve the number of participants for the study. The content of the poster was mainly a highlight about the ongoing study on women’s sexual health, and contained contacts of the primary investigator.
Data Management and Analysis

At the end of the day the questionnaires were checked for completion by the triage nurse who then filed the questionnaires and stored them in a locked cupboard for collection. The data from the forms were entered into a Microsoft excel sheet in a password protected computer and later analyzed using SPSS version 22. Continuous variables were summarized using means or median with their corresponding measures of variability (SD or IQR) while categorical data was summarized using frequency counts with corresponding percentages. Prevalence of FSD was calculated as a proportion of the women with FSD in the population of all women interviewed. This was stratified by type of contraceptive (hormonal and non-hormonal) and the two proportions compared using two sample tests of independent populations.

Calculation of the FSFI scores were done using the responses for the questions from each of the domains. Each of the domains’ questions score ranged from 1-5 with two questions for desire domain, four questions each for arousal and vaginal lubrication, orgasm, three questions each for pain and sexual satisfaction. The total score was calculated by adding the scores in a particular domain, then multiplying it by a set coefficient for each domain. The set coefficients were 0.3 for sexual arousal and vaginal lubrication, 0.6 for desire, 0.4 for orgasm, sexual pain and sexual satisfaction. The final FSFI score was then calculated by adding all the scores for each domain and this ranged between 2-36.

FSD was measured on categorical binary scale where any woman with a total score of below 26.55 is considered to have sexual dysfunction and higher scores are indicative of better sexual function (without FSD). This tool was developed and validated by Rosen and its reliability was calculated using Cronbach’s alpha for internal reliability and multivariate analysis of variance, dysfunction diagnosis x FSFI domain with Bonferroni- corrected post hoc comparisons to be 0.82 (69).

Independent associations of the explanatory factors with the outcome variable were assessed using chi-square test of association and the variables with a P < 0.25 were used in the multivariate analysis. Factors associated with FSD were determined using binary logistic regression adjusting for the influence of the variables on each other or any possible confounding factor.

Ethical Considerations

The study commenced after ethical approval from the AKUHN ethical review committee. Informed consent was obtained prior to recruiting participants into the study and it was made clear that participants will be free of coercion inducement or intimidation. Participation in the study did not have any reward nor did declining from the study interfere with their agenda of attending the respective clinic.

Subject confidentiality was fully maintained and before enrolling into the study the subjects were fully explained to about the nature of the study and what it intended to find. This was done by the
triage nurses (female) at the respective clinic who doubled up as the research assistant. The subjects had the final decision on whether to participate in the study or not. The participants were free to drop out or withdraw from the study at any time.

Study numbers were assigned to participants and their actual names did not appear in any of the data collection tools.

Only mobile phone numbers were linked to each questionnaire. Participants were only traced by personal phone call by the primary investigator if the FSFI scores were less than the cut-off of 26.55 which screens positive for sexual dysfunction for referral to gynecology clinic for help.

There were no obvious risks of participating in the study. The participants who were diagnosed to have FSD were encouraged to seek care and were referred for specialized management at the gynecology clinic.
A total number of 596 participants were recruited from three clinics: gynecology outpatient clinic, family medicine clinic and family planning clinic over the study duration of February to April 2018. They submitted completed questionnaires of which 30 (5%) were excluded due to incomplete data. Data from 566 participants were included in the analysis after checking for data completeness and confirmation of informed consent and eligibility criteria. The mean age of the participants was 32 years whereas the mean age of their partners was not much higher at 36 years. Most of the participants were married (67%), and the majority had attained tertiary education (82%). A large majority, (98%) were African. Sixty two percent had salaried employment. Only (13%) had a chronic illness and (10%) were on chronic medication. Most (67%) of the women were multiparous and (9%) of the participants had had at least one miscarriage. Christians comprised the majority (97%) and (30%) of women used alcohol of which (9%) used it within recommended limits of two units a week and (21%) used alcohol in excess of the recommended amount for women (70). A minority (6%) of them were active smokers. This has been elaborated in table 1.
Table 1: Socio-demographic characteristics of the study participants.

<table>
<thead>
<tr>
<th>Category</th>
<th>n</th>
<th>(%)</th>
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</thead>
<tbody>
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<td><strong>All study participants</strong></td>
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<td>100</td>
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<tr>
<td><strong>Age of subjects (years):</strong></td>
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<tr>
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<td>(7.1)</td>
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<td><strong>Age of partners (years):</strong></td>
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<td></td>
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<tr>
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<td>(7.8)</td>
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<td>2</td>
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<tr>
<td>Secondary Education</td>
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<td>16</td>
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<tr>
<td>Tertiary Education</td>
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<td>82</td>
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<td></td>
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<tr>
<td>Single</td>
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<td>20</td>
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<tr>
<td>Married</td>
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<td>67</td>
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<td>Separated</td>
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<td>2</td>
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<td>Divorced</td>
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<td>Other*</td>
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<td><strong>Chronic illness</strong></td>
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<td></td>
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<td>Present</td>
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<td>13</td>
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<td>Absent</td>
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<td>87</td>
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<td><strong>Use of chronic medication</strong></td>
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<td>Nulliparous</td>
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<tr>
<td>Multiparous</td>
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<td>67</td>
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<tr>
<td><strong>Miscarriages</strong></td>
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<td>53</td>
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<tr>
<td></td>
<td>513</td>
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**Religion**

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<td>97</td>
</tr>
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<td>Islam</td>
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<td>2</td>
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<tr>
<td>Other***</td>
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**Alcohol use**

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<td>30</td>
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<td>No</td>
<td>396</td>
<td>70</td>
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<td>Within recommended limits</td>
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<td>8</td>
</tr>
<tr>
<td>Excess of recommended limits</td>
<td>122</td>
<td>22</td>
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**Smoking status**

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<td>33</td>
<td>6</td>
</tr>
<tr>
<td>No</td>
<td>533</td>
<td>94</td>
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</table>

**Use of Hormonal contraception**

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<td>Yes</td>
<td>235</td>
<td>41</td>
</tr>
<tr>
<td>No</td>
<td>331</td>
<td>59</td>
</tr>
</tbody>
</table>


***other in “Religion” included: ‘Atheist’.

23
Contraceptive use and FSD

Majority of the participants were using non-hormonal contraception (59%), mainly male and female condoms (21%), natural methods (17%) and the intrauterine device (Copper T) (12%). The rest (42%) were using hormonal methods including oral contraceptive pills (14%), implants (12%) and levonorgestrel-releasing intrauterine system (7%), as shown in Figure 1 below.

Figure 2: Frequency of use of Contraceptive methods by the study participants.

We used the defined cut-off score of 26.55 points to determine the participants who had sexual dysfunction. The overall prevalence of FSD was (39%) (219 of the 566 participants) in this study population. The hormonal contraceptive users had a prevalence of (52%) while the non-hormonal contraceptive users had a prevalence of (30%) which was a significant difference. The prevalence of FSD for each of the contraception is presented in Table 2. The prevalence was highest in implant users (63%) followed by those on oral contraceptive pill users (57%).
Table 2: Contraceptive use and prevalence of FSD

<table>
<thead>
<tr>
<th></th>
<th>n with FSD</th>
<th>Total eligible</th>
<th>Prevalence of FSD (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All study participants:</td>
<td>219</td>
<td>566</td>
<td>39</td>
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<tr>
<td>Participants on hormonal contraceptives:</td>
<td>121</td>
<td>235</td>
<td>52</td>
</tr>
<tr>
<td>Implants</td>
<td>44</td>
<td>70</td>
<td>63</td>
</tr>
<tr>
<td>Oral contraceptive pill</td>
<td>42</td>
<td>74</td>
<td>57</td>
</tr>
<tr>
<td>Injectable</td>
<td>16</td>
<td>34</td>
<td>47</td>
</tr>
<tr>
<td>Hormonal coil</td>
<td>15</td>
<td>39</td>
<td>39</td>
</tr>
<tr>
<td>Transdermal patches</td>
<td>7</td>
<td>24</td>
<td>29</td>
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<tr>
<td>Vaginal rings</td>
<td>1</td>
<td>1</td>
<td>100</td>
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<tr>
<td>Participants on non-hormonal contraceptives:</td>
<td>98</td>
<td>331</td>
<td>30</td>
</tr>
<tr>
<td>Male and female condoms</td>
<td>42</td>
<td>119</td>
<td>35</td>
</tr>
<tr>
<td>Natural methods</td>
<td>42</td>
<td>97</td>
<td>35</td>
</tr>
<tr>
<td>Non-hormonal coil</td>
<td>19</td>
<td>68</td>
<td>28</td>
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<td>Tubal ligation</td>
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<td>31</td>
<td>26</td>
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<td>Vaginal douching</td>
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<tr>
<td>Spermicides</td>
<td>0</td>
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</table>

We examined the association between the various social and demographic factors among all women in the study group (Table 3).
Table 3: Prevalence of FSD across different categories of socio-demographic factors.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency/mean</th>
<th>Percent/SD</th>
<th>Absence (n=347)</th>
<th>Present (n=219)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of Participants (mean) (SD)</td>
<td>32.3/7.1</td>
<td>32.5(7.0)/32.0(7)</td>
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<td>Age of Partner (mean) (SD)</td>
<td>36/7.8</td>
<td>36.2(7.8)/35.7(8)</td>
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<td>Marital status (frequency)</td>
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<td>0.296</td>
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<td>Single</td>
<td>116/21</td>
<td>67(58)/49(42)</td>
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</tr>
<tr>
<td>Married</td>
<td>381/67</td>
<td>244(64)/137(36)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Separated</td>
<td>9/2</td>
<td>4(44)/5(56)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>5/1</td>
<td>2(40)/3(60)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>55/10</td>
<td>30(55)/25(45)</td>
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<tr>
<td>Level of education</td>
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<td>Primary</td>
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<td>6(67)/3(33)</td>
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<tr>
<td>Secondary</td>
<td>93/16</td>
<td>56(60)/37(40)</td>
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<tr>
<td>Tertiary</td>
<td>464/82</td>
<td>285(61)/179(39)</td>
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<td>Race</td>
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<td>African</td>
<td>557/98</td>
<td>342(61)/215(39)</td>
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<tr>
<td>Asian</td>
<td>6/1</td>
<td>3(50)/3(50)</td>
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<tr>
<td>Others</td>
<td>3/1</td>
<td>2(67)/1(33)</td>
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<td>Unemployed</td>
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<td>Use of hormonal method</td>
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<td>&lt; 0.0001</td>
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<td>114(49)/121(52)</td>
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<td>No</td>
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<td>233(70)/98(30)</td>
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<td>Presence of chronic illness</td>
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<tr>
<td>No</td>
<td>395</td>
<td>70</td>
<td>233 (59)</td>
<td>162 (41)</td>
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<td>Smoking status</td>
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<td>6</td>
<td>20 (61)</td>
<td>13 (40)</td>
<td>0.932</td>
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<td></td>
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<tr>
<td>No</td>
<td>533</td>
<td>94</td>
<td>327 (61)</td>
<td>206 (39)</td>
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<td></td>
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<td>Within limits</td>
<td>48</td>
<td>9</td>
<td>28 (58)</td>
<td>20 (42)</td>
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<tr>
<td>None</td>
<td>396</td>
<td>70</td>
<td>234 (59)</td>
<td>162 (41)</td>
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<td>Excessive</td>
<td>122</td>
<td>22</td>
<td>85 (70)</td>
<td>37 (30)</td>
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<td>Parity</td>
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<td>Nulliparous</td>
<td>188</td>
<td>33</td>
<td>114 (61)</td>
<td>74 (36)</td>
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<td>Multiparous</td>
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<td>233 (62)</td>
<td>145 (38)</td>
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<td>Miscarriage</td>
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<td>91</td>
<td>308 (60)</td>
<td>205 (40.0)</td>
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<td>Yes</td>
<td>53</td>
<td>9</td>
<td>39 (73)</td>
<td>14 (26)</td>
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The socio-demographic factors found to be significant (variables with a P < 0.25) were used in the multivariate analysis described as model I in Table 4 below. These factors associated were then assessed using binary logistic regression adjusting for marital status, level of education and age of self as described in model II in Table 4 below even though they did not meet the cut-off, as these are possible confounding factors and other studies have shown their significance in association with FSD. There was collinearity between alcohol intake and alcohol use, therefore alcohol use was fit in the multivariate model instead of alcohol intake. We grouped marital status into single, married, and others (merged separated, divorced, and other) and religion was categorized as Christians and others (Islam, no religion, other religions) in the regression analysis.
Table 4: Parameter estimates of the factors associated with FSD

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model I</th>
<th></th>
<th>P</th>
<th>Model II</th>
<th></th>
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<tr>
<td></td>
<td>OR</td>
<td>95% CI</td>
<td></td>
<td>OR</td>
<td>95% CI</td>
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<tr>
<td>Single</td>
<td>0.768</td>
<td>0.503-1.173</td>
<td>0.221</td>
<td>0.554</td>
<td>0.333-0.922</td>
<td>0.023</td>
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<td>Married</td>
<td>0.768</td>
<td>0.688-2.282</td>
<td>0.460</td>
<td>1.235</td>
<td>0.658-2.320</td>
<td>0.511</td>
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<tr>
<td>Other*</td>
<td>1.253</td>
<td></td>
<td></td>
<td>1.256</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of education</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>1.321</td>
<td>0.311-5.615</td>
<td>0.706</td>
<td>0.941</td>
<td>0.199-4.442</td>
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<tr>
<td>Secondary</td>
<td>1.321</td>
<td>0.310-5.086</td>
<td>0.749</td>
<td>1.086</td>
<td>0.241-4.895</td>
<td>0.914</td>
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<td>Tertiary</td>
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<td></td>
<td>1.247</td>
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<td>Race</td>
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<td></td>
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<tr>
<td>African</td>
<td>1.591</td>
<td>0.318-7.952</td>
<td>0.572</td>
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<td>Asian</td>
<td>0.795</td>
<td>0.072-8.824</td>
<td>0.852</td>
<td></td>
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<td></td>
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<tr>
<td>Others</td>
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<td>Employment status</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Salaried employment</td>
<td>1.382</td>
<td>0.925-2.063</td>
<td>0.114</td>
<td>1.362</td>
<td>0.883-2.102</td>
<td>0.163</td>
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<tr>
<td>Self-employment</td>
<td>1.382</td>
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<tr>
<td>Unemployed</td>
<td>1.278</td>
<td>0.768-2.129</td>
<td>0.345</td>
<td>0.696-2.234</td>
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<tr>
<td>Use of hormonal method</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Yes</td>
<td>2.524</td>
<td>1.782-3.574</td>
<td>&lt; 0.0001</td>
<td>2.695</td>
<td>1.869-3.886</td>
<td>&lt; 0.0001</td>
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<td>Yes</td>
<td>0.602</td>
<td>0.351-1.030</td>
<td>0.064</td>
<td>0.769</td>
<td>0.300-1.971</td>
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<td>Yes</td>
<td>0.564</td>
<td>0.304-1.048</td>
<td>0.07</td>
<td>0.77</td>
<td>0.258-2.296</td>
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<td>Religion</td>
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<tr>
<td>Christian</td>
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<td>0.226-1.877</td>
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<td>Alcohol intake</td>
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</tr>
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<tr>
<td>Yes</td>
<td>1.032</td>
<td>0.52-2.119</td>
<td>0.932</td>
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</tr>
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<td></td>
<td></td>
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<tr>
<td>Age of participants</td>
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<tr>
<td>Yes</td>
<td>0.991</td>
<td>0.968-1.015</td>
<td>0.454</td>
<td>1.01</td>
<td>0.979-1.040</td>
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<tr>
<td>No</td>
<td>0.993</td>
<td>0.971-1.014</td>
<td>0.502</td>
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</table>
The factor that was found to have a significant association with FSD was the use of Hormonal contraception which had an adjusted odds ratio of 2.695, (1.869 to 3.886, P<0.0001). Other factor associations that were found not to be significant included; self-employment, adjusted odds ratio of 1.362 (0.883 to 2.102, P<0.163), unemployment adjusted odds ratio of 1.247, (0.696 to 2.234 P < 0.459), alcohol intake (excess of recommended limits): (adjusted odds ratio 0.582, (0.279 to 1.212, P < 0.148), having a history of miscarriage(s), adjusted odds ratio 0.613, (0.311 to 1.211, P< 0.159), having a chronic illness, adjusted odds ratio 0.769, (0.300 to 1.971, P< 0.585) and the use of chronic medication, adjusted odds ratio 0.77, (0.258 to 2.1, P< 0.59).

The above named factors showed a trend towards significant association with FSD as described in model I of Table 4 above, but the study was not powered enough to show this association.
DISCUSSION

The present study showed that the overall prevalence of FSD in the study group women was 38%, and compares well with other studies where the study sample had similar socio demographic characteristics to the participants in our study such as what has been reported by Moreira et al (2005) in Germany with prevalence of FSD at 38% (71, 72). In comparison, the prevalence of FSD has been reported to be much higher, as high as 73% in a Ghanaian prospective cross sectional survey Amidu et al (6) and 63% in a Nigerian cross sectional study by Fajewonyomi et al (37) even with the study populations having had many similar socio demographic characteristics. The trend of higher prevalence of FSD has been elucidated more in larger studies where peri and postmenopausal women were also included and different study tools had been used such as the Austrian study by Ponholzer et al (5) which showed a FSD prevalence of 62%, and 49% in a Brazilian cross sectional study by Abdo et al (3).

The prevalence of FSD in the women using hormonal contraception was 52%, compared to 30% amongst those using non-hormonal contraception which was noted to be significantly different. On the same note Wallwiener et al in 2015 reported that (37%) using oral hormonal contraceptives, and (31 %) using non-oral hormonal contraceptives were found to have FSD as compared to (27 %) of subjects using non-hormonal contraceptives (63). Although there exists contrary evidence that hormonal contraception has shown to increase positive indicators of sexual functioning as seen in a prospective study conducted by Guida et al in 2014 in Italy, (10) and in a similar study done by Higgins et al in 2015 which showed more positive method related changes in women using hormonal contraception, there is not much evidence of the effect of the scores of sexual functioning and comparator prevalence studies of FSD in two groups described (64). In the present study, the use of hormonal contraception and the difference in the prevalence of FSD in the two groups was noted to be statistically significant.

Alcohol intake was not found to have an effect on FSD for the women who took alcohol within and in excess of the recommended limits. This may be attributed the fact that only 30% of the study sample took alcohol at all. In comparison to this, a study done in Ghana by Amidu et al alcohol intake was the only significant risk factor associated with FSD (6). This may be attributed to the physiological effects of alcohol on the female genitalia and the psychological phenomena of ‘alcohol myopia’ and ‘alcohol expectancy’. These are cognitive-physiological theories which are explained as a consequence of alcohol’s narrowing of perceptual and cognitive functioning. This can affect the expressions and emotions of women, and are associated with thoughts of pleasure, sexual performance or distress (73).

History of miscarriage(s) was also not found to have a significant association with FSD in our study. This is contrary to findings of Shreffler et al (2011) who discussed how loss of pregnancy had a lasting effect of emotions of guilt or distress that had strong psychological implications and could eventually lead to have a significant effect on sexual function (74).
There was no significant association of having a chronic illness and the use of chronic medication with FSD in our study. This is contrary to most studies which show a consistent proportional negative effect of chronic disease on sexual function (27). Many chronic illnesses such as diabetes, HIV and rheumatoid arthritis exert unwanted effects via pathophysiological mechanisms, eventually reducing sexual satisfaction scores in the women who have them (11, 44-46). The most common chronic illness present in our study population was hypertension. As explained above only a small percentage (13%) of women in our study population had any chronic illness, had a young median age (32 years) and only (10%) used any chronic medication therefore our findings are contrary to those of Doumas et al in 2006 that showed a significant association of having hypertension with FSD in a larger study of sexually active hypertensive women (75).

The present study also showed that being self-employed or unemployed did not have a significant effect on sexual dysfunction. This was in comparison to the association of employment status and FSD that has been shown in many different studies done in different parts of the world (4, 5, 18, 27, 34). This is attributed to the understanding that the women who are more financially stable are likely to have higher levels of confidence and self-esteem contributing to higher sexual satisfaction scores than unemployed women. Employed women also tend to have better interpersonal skills which are associated with better desire and more willingness to have sexual activity (18, 27, 76).

There was no significant effect of smoking on FSD in our study population which is contrary to findings reported in other studies which have shown stronger associations (77). This is related to mechanisms of the negative effects of nicotine on the vascular system reducing genital blood flow by inhibiting vasoactive substances such as endothelial relaxin factor, Nitric Oxide (78). This association was not seen in the present study and most likely due to the small number (6%) of active smokers in the population compared to larger populations of smokers in Europe and USA.

The study participants were noted to be a generally young population with small age gaps with their partners. A large number were non-smokers and did not take alcohol. This corresponded to very few of them having chronic illnesses and fewer of them using any chronic medications. Majority of them shared characteristics such as being married, having a tertiary education and being employed. An expected finding was that most women belonged to the African race, were Christians and had had more than one pregnancy.

It was noted in the present study that, more participants were using non-hormonal methods of contraception than hormonal methods mainly male and female condoms and natural methods. In the group of hormonal contraception users most were using oral contraceptives and implants. This is contrary to the report of the Kenya demographic and health survey (2014) which stated a higher prevalence of hormonal contraception with majority using injectable methods (19).
Increasing age of participants and higher ages of their partners have shown to have significant negative effect on sexual dysfunction as seen in other studies but this did not reflect in our findings and it could be largely due a younger mean age of participants in the present study and smaller age gaps with their partners as seen in the present study population (4, 27, 35).

The present study did not find a significant association between level of education and FSD. This association has not been clearly defined in literature as well with some studies showing an inverse effect of the years of education and prevalence of FSD such as the cross sectional study conducted in Nigeria by Fajewonyomi et al (37). Other larger studies still report a proportionate effect on FSD (4, 27). The association may not have come out very clear in the present study population as majority of the participants had attained tertiary level of education there were very few with the lower levels of education.
STUDY LIMITATIONS

The present study may not be generalizable to the entire population of Kenya as it was conducted in a tertiary hospital in the private health care clinical setting with majority of the participants having high education levels, more financial security and health insurance and higher employment levels. This also limited the ability of the study to elaborate other associations that were close to significant in the study sample such as employment, education levels and religion.
CONCLUSIONS

The present study found a high prevalence FSD in the study population. The most common methods of contraception were the use of male and female condoms and natural methods followed by the use of oral contraceptives and implants. We noted a strong association of FSD with the use of hormonal contraception. Other factors were found to have close to significant association with FSD but this study was not adequately powered to show this association. These factors included self-employment and unemployment, use of alcohol within and in excess of recommended limits, a history of miscarriages, and the presence of any chronic illness or use of any chronic medication showed less significant associations with FSD.
RECOMMENDATIONS

We would like to recommend the establishment of multidisciplinary clinics for sexual disorders which would include holistic consultations and management by a team that should consist of sex therapists, gynecologists, trained nurses and counsellors to help deal with the problem of FSD. Women who are seeking to start on or continue any form of contraception should be adequately educated on pros and cons of different methods and should be screened for pre-existing FSD. Further studies on the same topic should be conducted in more centers including rural settings in Kenya after adequate translation and validation of FSFI questionnaire to Kiswahili and in populations where some of the expected associations can be better evaluated and to build on this knowledge by further elaborating the association of each individual type of hormonal contraception with FSD.
DISSEMINATION OF STUDY FINDINGS

The results of this study are expected to benefit at institutional, national and the wider international audience level. At the institutional level it will help improve physicians’ insight and awareness of prevalence levels of FSD and the prevailing factors in our setting that may influence this important aspect of sexual health, especially in women of reproductive age. It is aimed at improving practices in primary and secondary care levels.

Results from this study will be disseminated through publications in peer-reviewed journals and presented at scientific conferences specifically at the Kenya Association of Family physicians (KAFP) and Kenya obstetrics and gynecology society (KOGS).
REFERENCES


60. Davis SR. Should women receive androgen replacement therapy, and if so, how? Clinical endocrinology. 2010;72(2):149-54.


APPENDICES
APPENDIX A: Consent Form

AGA KHAN UNIVERSITY CONSENT TO PARTICIPATE IN A RESEARCH STUDY

Study Title: COMPARISON OF PREVALENCE AND FACTORS ASSOCIATED WITH SEXUAL DYSFUNCTION AMONGST WOMEN USING HORMONAL AND NON HORMONAL CONTRACEPTION.

Dr. Momin Rizwan Butt, a student at the Aga Khan University, is conducting a study to determine compare the prevalence of sexual dysfunction in women of reproductive age using hormonal and non-hormonal contraception.

Research studies include only people who choose to take part. Please take your time to make your decision about participating, and discuss your decision with your family or friends if you wish. If you have any questions, you may ask the researchers.

You are being asked to take part in this study because you are a woman of reproductive age and are using either a hormonal or non-hormonal method of contraception.

Why is this study being done?

The purpose of this study is to learn the effects if any of hormonal and non-hormonal forms of contraception on female sexual function.

This study is being funded by the academic office of The Aga Khan University.

How many people will take part in this study?

About 600 women will take part in this study

What will happen if I take part in this research study?

If you agree, the following procedures will occur:

You will be given two questionnaires to fill.

1. The first one is called the demographic questionnaire which will include a set of questions about your biodata.
2. The second questionnaire is the female sexual function index (FSFI) which is an internationally renowned tool for screening and diagnosing female sexual dysfunction.

The study will take about 20 minutes of your time to fill in the questionnaires.

This will take place at the family planning clinic, Family medicine clinic and gynaecology outpatient clinics of the hospital.

**Can I stop being in the study?**

Yes. You can decide to stop at any time. Just tell the study researcher or staff person right away if you wish to stop being in the study.

Also, the study researcher may stop you from taking part in this study at any time if he or she believes it is in your best interest, if you do not follow the study rules, or if the study is stopped.

The research is both confidential and anonymous. You are under no pressure from your health care provider to participate. Your care will not change as a result of your responses to the survey.

**What side effects or risks can I expect by being in this study?**

There are no obvious harmful effects imposed to you by participating in the study.

**Are there benefits to taking part in the study?**

If you so wish, you may be contacted for a referral to relevant medical service if you are diagnosed to have sexual dysfunction.

**What other choices do I have if I do not take part in this study?**

You are free to choose not to participate in the study. If you decide not to take part in this study, there will be no penalty to you. You will not lose any of your regular benefits, and you can still get your care from this institution the way you usually do.
Will information about me be kept private?

No individual identities will be used in any reports or publication resulting from this study. We will do our best to make sure that the personal information gathered for this study is kept private. If information from this study is published or presented at scientific meetings, your name and other personal information will not be used.

Participation in research may involve a loss of privacy, but information about you will be handled as confidentially as possible. Hospital regulations require that all health care providers treat information in medical records confidentially.

What are the costs of taking part in this study?

There are no financial costs imposed to you if you wish to participate in the study.

Will I be paid for taking part in this study?

Participation in this study will be entirely voluntary and you shall not receive any financial benefit if you participate in this study.

What are my rights if I take part in this study?

Taking part in this study is your choice. You may choose either to take part or not to take part in the study. If you decide to take part in this study, you may leave the study at any time. No matter what decision you make, there will be no penalty to you in any way. You will not lose any of your regular benefits, and you can still get your care from our institution the way you usually do.

Who can answer my questions about the study?

If you have further questions about this study, you can talk to the investigator. You can contact Dr. Momin Rizwan Butt on mobile phone number +254726455511.

If you have any questions, comments, or concerns about taking part in this study, first talk to the researcher. If for any reason you do not wish to do this, or you still have concerns after doing so, you may contact the Academic office, Aga Khan University, East Africa via research.support@aku.edu

You have been given a copy of this consent form to keep.
PARTICIPATION IN RESEARCH IS VOLUNTARY. You have the right to decline to be in this study, or to withdraw from it at any point without penalty or loss of benefits to which you are otherwise entitled.

If you wish to participate in this study, you should sign below.

__________________________________________________________
Date                  Participant's Signature for Consent

__________________________________________________________
Date                  Person Obtaining Consent
APPENDIX B: Demographic Questionnaire

Study No: ________

Phone number: _________

Do not write your name anywhere on this questionnaire.

1. What is your date of birth? _______
   What was your age at your last birthday? _______

2. What is the age of your partner? _______

3. What is your relationship status?
   I. Married
   II. Single
   III. Divorced
   IV. Separated
   V. Other (specify) _______

4. What is the highest education level you have attained?
   I. None
   II. Primary education
   III. Secondary education
   IV. Tertiary education

5. Which one do you consider is your race?
   I. African
   II. Asian
   III. Caucasian
   IV. Other (specify) _______

6. Which of the following categories best describes your employment status?
   I. Salaried employment
   II. Self employed
   III. Unemployed
7. Which of the methods below have you mostly used to prevent pregnancy in the last four weeks? (circle one)

<table>
<thead>
<tr>
<th>Hormonal Methods</th>
<th>Non-hormonal methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Injectable contraceptive such as ‘Depo-Provera’, ‘Megestron’, ‘Norigynon’ and ‘Noristerat’.</td>
<td>g) Male and female condoms</td>
</tr>
<tr>
<td>b) Oral contraceptive pills such as ‘diane’,’ Logynon’, ‘Marvelon’, ‘Mercilon’, ‘Microgynon’, Yasmin’, ‘Microlut’, ‘Microval’, ‘Nordette’ and Trinordiol.</td>
<td>h) Bilateral tubal ligation (BTL) or Vasectomy done on partner</td>
</tr>
<tr>
<td>c) Transdermal patches.</td>
<td>i) Non hormonal coils including copper intra uterine device (IUD).</td>
</tr>
<tr>
<td>d) Implants such as ‘Implanon’, ‘Jadelle’ and ‘Norplant’.</td>
<td>j) Natural methods including calendar rhythm method and coitus interruptus.</td>
</tr>
<tr>
<td>e) Vaginal rings.</td>
<td>k) Lactational amenorrhea method (LAM).</td>
</tr>
<tr>
<td>f) Hormonal coil (Hormonal IUD) such as ‘Mirenna’.</td>
<td>l) Spermicides.</td>
</tr>
<tr>
<td></td>
<td>m) Vaginal Douching</td>
</tr>
</tbody>
</table>

8. DO you suffer any chronic medical conditions (e.g. asthma, diabetes, high blood pressure, HIV etc.?) If yes please specify the condition (s) below if not please leave blank. ________________________________
9. Are you on any chronic medications for any chronic conditions?
   I. Yes
   II. No

   If yes, please specify: ___________________ 

10. If you have ever been pregnant please fill below.
    I. Deliveries after 5 months ________________
    II. Children alive today _________________
    III. Deliveries before 5 months (miscarriages) __

11. What is your religious persuasion?
    I. Muslim
    II. Hindu
    III. Christian
    IV. None
    V. Other specify: ________________

12. Do you currently take alcohol?
    I. Yes
    II. No

    If yes, please specify:
    a. How many days per week do you drink Alcohol on average? ________
    b. How many drinks do you have on a typical day? ________
    c. Maximum drinks on a single occasion in the past month? ________

    (One drink is equivalent to one beer/ one glass of 12.9% wine/ one shot of whisky or rum.)

13. Do you currently smoke?
    I. Yes
    II. No
APPENDIX C: Female Sexual Function Index (FSFI)

Female Sexual Function Index (FSFI) ©

Subject Identifier ___________________________ Date ________________

INSTRUCTIONS: These questions ask about your sexual feelings and responses during the past 4 weeks. Please answer the following questions as honestly and clearly as possible. Your responses will be kept completely confidential. In answering these questions the following definitions apply:

Sexual activity can include caressing, foreplay, masturbation and vaginal intercourse.

Sexual intercourse is defined as penile penetration (entry) of the vagina.

Sexual stimulation includes situations like foreplay with a partner, self-stimulation (masturbation), or sexual fantasy.

CHECK ONLY ONE BOX PER QUESTION.

Sexual desire or interest is a feeling that includes wanting to have a sexual experience, feeling receptive to a partner's sexual initiation, and thinking or fantasizing about having sex.

1. Over the past 4 weeks, how often did you feel sexual desire or interest?

☐ Almost always or always
☐ Most times (more than half the time)
☐ Sometimes (about half the time)
☐ A few times (less than half the time)
☐ Almost never or never

2. Over the past 4 weeks, how would you rate your level (degree) of sexual desire or interest?

☐ Very high
☐ High
☐ Moderate
☐ Low
☐ Very low or none at all

Page 1 ©FSFI}
Sexual arousal is a feeling that includes both physical and mental aspects of sexual excitement. It may include feelings of warmth or tingling in the genitals, lubrication (wetness), or muscle contractions.

3. Over the past 4 weeks, how often did you feel sexually aroused ("turned on") during sexual activity or intercourse?
   - [ ] No sexual activity
   - [ ] Almost always or always
   - [ ] Most times (more than half the time)
   - [ ] Sometimes (about half the time)
   - [ ] A few times (less than half the time)
   - [ ] Almost never or never

4. Over the past 4 weeks, how would you rate your level of sexual arousal ("turned on") during sexual activity or intercourse?
   - [ ] No sexual activity
   - [ ] Very high
   - [ ] High
   - [ ] Moderate
   - [ ] Low
   - [ ] Very low or none at all

5. Over the past 4 weeks, how confident were you about becoming sexually aroused during sexual activity or intercourse?
   - [ ] No sexual activity
   - [ ] Very high confidence
   - [ ] High confidence
   - [ ] Moderate confidence
   - [ ] Low confidence
   - [ ] Very low or no confidence

6. Over the past 4 weeks, how often have you been satisfied with your arousal (excitement) during sexual activity or intercourse?
   - [ ] No sexual activity
   - [ ] Almost always or always
   - [ ] Most times (more than half the time)
   - [ ] Sometimes (about half the time)
   - [ ] A few times (less than half the time)
   - [ ] Almost never or never
7. Over the past 4 weeks, how often did you become lubricated ("wet") during sexual activity or intercourse?

- __ No sexual activity
- Almost always or always
- Most times (more than half the time)
- Sometimes (about half the time)
- A few times (less than half the time)
- Almost never or never

8. Over the past 4 weeks, how difficult was it to become lubricated ("wet") during sexual activity or intercourse?

- __ No sexual activity
- Extremely difficult or impossible
- Very difficult
- Difficult
- Slightly difficult
- Not difficult

9. Over the past 4 weeks, how often did you maintain your lubrication ("wetness") until completion of sexual activity or intercourse?

- __ No sexual activity
- Almost always or always
- Most times (more than half the time)
- Sometimes (about half the time)
- A few times (less than half the time)
- Almost never or never

10. Over the past 4 weeks, how difficult was it to maintain your lubrication ("wetness") until completion of sexual activity or intercourse?

- __ No sexual activity
- Extremely difficult or impossible
- Very difficult
- Difficult
- Slightly difficult
- Not difficult
11. Over the past 4 weeks, when you had sexual stimulation or intercourse, how often did you reach orgasm (climax)?

- No sexual activity
- Almost always or always
- Most times (more than half the time)
- Sometimes (about half the time)
- A few times (less than half the time)
- Almost never or never

12. Over the past 4 weeks, when you had sexual stimulation or intercourse, how difficult was it for you to reach orgasm (climax)?

- No sexual activity
- Extremely difficult or impossible
- Very difficult
- Difficult
- Slightly difficult
- Not difficult

13. Over the past 4 weeks, how satisfied were you with your ability to reach orgasm (climax) during sexual activity or intercourse?

- No sexual activity
- Very satisfied
- Moderately satisfied
- About equally satisfied and dissatisfied
- Moderately dissatisfied
- Very dissatisfied

14. Over the past 4 weeks, how satisfied have you been with the amount of emotional closeness during sexual activity between you and your partner?

- No sexual activity
- Very satisfied
- Moderately satisfied
- About equally satisfied and dissatisfied
- Moderately dissatisfied
- Very dissatisfied
APPENDIX D: Study Poster

THE AGA KHAN UNIVERSITY

STUDY ON WOMEN’S SEXUAL HEALTH

Kindly participate if you are using any type of contraception

For details contact
DR. Momin Butt
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