



## Female Infertility Investigation and Statistics

Nutan Verma<sup>1</sup>, Vivek Raich<sup>2</sup> and Sharad Gangele<sup>1</sup>

<sup>1</sup>Department of Computer Science and Application, R.K.D.F. University, Bhopal (Madhya Pradesh), India

<sup>2</sup>Department of Mathematics, Govt. Holkar Science College, Indore (Madhya Pradesh), India

(Corresponding author: Nutan Verma)

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**ABSTRACT:** Infertility is childlessness. Infertility, emerging as a global real time problem. Male and female, individual or both, are responsible for infertility. In this paper, specifically investigated female infertility on following eight factors Fertility, Age, Menstruation Cycle, BMI, Profile and Radiation OR Stress and Working Environment, Economic, Education and Thyroid (TSH). Investigation is done on 50 females, aged between 18 to 30 years and data is collected through survey.

**Keywords:** Infertility, Fertility, Age, Menstruation Cycle, BMI, Profile and Radiation OR Stress and Working Environment, Economic, Education and Thyroid (TSH).

### I. INTRODUCTION

This is an electronic age. Everyday routine life of modern man is completely surrounded by electronic like communication, entertainment, education, medical services, technological development etc. Hence, human life become automatics. Hence, reduced physical work. This extreme electrical involvement adversely affects human health and becomes reason for many health disorders. Infertility, emerging as a global real time problem. According to bulletin of The World Health Organization (WHO), infertility affects up to 15% of reproductive-aged couples world wide (<http://www.who.int/bulletin/volumes/88/12/10-011210/en/>). In this paper, female infertility is specifically investigated on following eight factors Fertility, Age, Menstruation Cycle, BMI, Profile and Radiation OR Stress and Working Environment, Economic, Education and Thyroid (TSH).

### II. FEMALE INFERTILITY

In day to day life infertility is childlessness [39]. Infertility, defined as 1 year of attempted conception without success, is one of the most prevalent chronic health disorders involving young adults. Clinical evaluation of infertility is indicated if a pregnancy has not occurred after 1 year of regular unprotected intercourse, because by that time 85% of couples attempting conception will have been successful [31,32,38]. Male and female, both or individual, are responsible for infertility [6]. Fundamentally, there are two types of female infertility primary and secondary infertility. Primary Infertility refers to the condition in which a couple has never been able to conceive [11]. Secondary Infertility refers to those cases where a couple has been successful in conceiving at least once but has been unsuccessful after that [18,27]. The female reproductive system is made up of internal organs and external structures. Its function is to enable reproduction of the species.

Sexual maturation is the process that this system undergoes in order to carry out its role in the process of pregnancy and birth [21,22]. The female reproductive system is principally regulated by following hormones including estradiol, progesterone, follicle stimulating hormone, and luteinizing hormone.

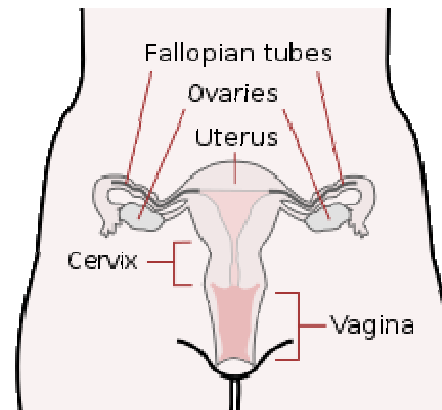


Fig. 1. Female Reproductive System.

The ovary and uterus are two different reproductive organs involved in female menstrual cycle phenomenon. The ovary produces ova or egg, is a location where follicle grows. The uterus also known as the womb is an organ where offspring are conceived and in which they carry before birth. The majority of infertility cases, both male and female factors, are overcome through surgical and medical infertility treatment. Medical treatment options include Assisted Reproductive Techniques (ART) such as In-vitro Fertilization (IVF), Intra-Cytoplasmic Sperm Injection (ICSI), and Intra-Uterine Insemination (IUI). Infertility treatment has been dramatically advanced in recent years; however, age related infertility remains as one of the most difficult challenges [19, 30].

### III. FEMALE INFERTILITY INVESTIGATION FACTORS

Female infertility is investigated on hormonal and structural (female reproductive anatomy) or both perspectives. Female infertility may cause because of many reasons but after detail study of female infertility considered factors found major among them corresponding to the hormonal perspective. Succeeding are the eight factors on which female infertility is being investigated Fertility, Age, Menstruation Cycle, BMI, Profile and Radiation OR Stress and Working Environment, Economic, Education and Thyroid (TSH). Data collection method is survey. Total data sample size is 50. Means investigation is done on 50 females, aged between 18-30 yrs.

#### A. Fertility

Relationship between fertility and infertility is both are inversely-proportional to each other. Means if fertility increases then by default infertility decreases or if infertility increases then by default fertility decreases. Both terms are opposite terms. Where fertility term gives positive effect and infertility is corresponding to negativity. Therefore, fertility factor is considered to investigate infertility. Infertility has a long-term effect on fertility. The high infertility rate in a population has a dampening effect on fertility and the rate of population growth [7,9]. According to the study fertility is divided into two parts first is fertility status and pregnancy ratio. This survey is done in total no. of females is 50. In the fertility status shows the 74% females have child is out of 100%, 14% females are infertile is out of 100%, 6% female is pregnant and 6% female is in protection is out of 100% (Fig. 2).

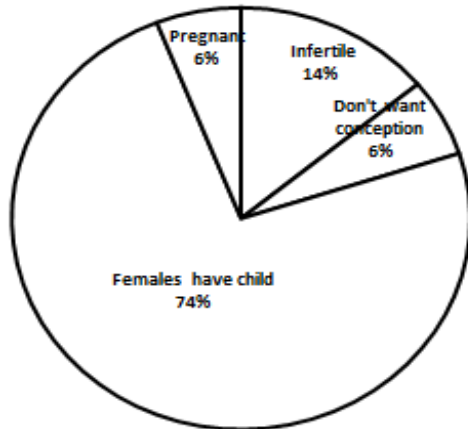


Fig. 2. Female Fertility Ratio.

In the second part 72 % females are naturally pregnant, 8% females are medically pregnant, 6% females are both type pregnant and 14% females are infertile. All the status and parameters are finding is out of 100% (Fig. 3).

#### B. Age

Age is a crucial factor to estimate fertility because at specific age female ovary starts producing eggs (puberty age) and gradually coming at the end when ovary stops producing eggs (menopause).

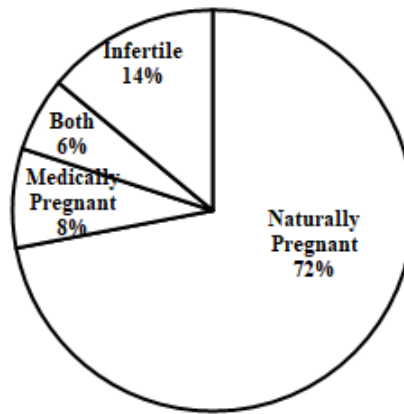


Fig. 3. Pregnancy Ratio.

As the age increases rate of producing eggs decreases. Because a female has finite numbers eggs to producing through-out the productive age. According to the statistics on female age, declining fertility [36], there is a slow decline in pregnancy rates in the early 30's, while it becomes more substantial in the late 30's and early 40's. In addition to decline in pregnancy, miscarriage rates also increase as the mother ages and very few women over 44 are still fertile. The same trend is seen in pregnancy rate following infertility treatment as in vitro fertilization success rates start dropping in the early 30's and fall faster starting at about age 38 [41].

The age has positive association with infertility and the conceptual framework which highlighted age as a factor directly associated with infertility [15,34,28]. The study showed that age pattern follows S1 is vary 18-22 years, S2 is 22-26 years and S3 is 26-30 years. In the age group 52% females belongs S2 group, 26% females are in S3 group and 22% females are in S1 group (Fig. 4).

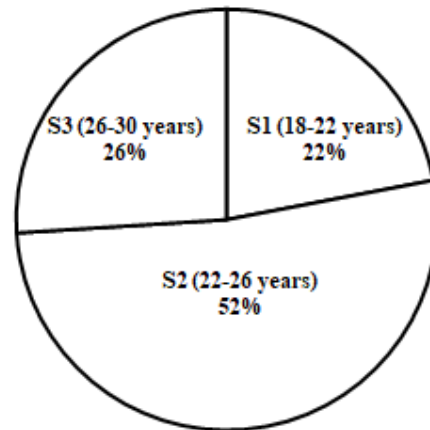


Fig. 4. Age Group.

In the infertile females from age group are 14% females in S1group, 43% females in S2 group, and 43% females in S3. The maximum number of infertile females belonging to age group 24-29 years and infertile female's number of marriage years or marriage duration is 2-7 years (Fig. 5).

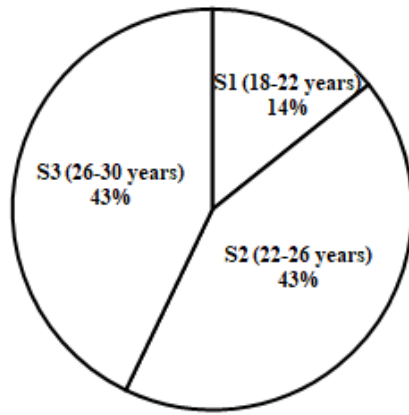


Fig. 5. Female Infertility according to Age Group.

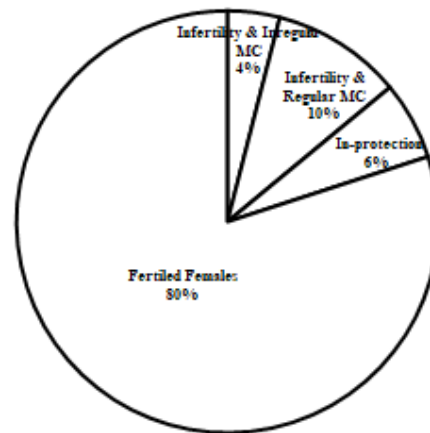


Fig. 6. Infertility and Menstrual Cycle.

### C. Menstruation Cycle

Female fertility study begins with the study of female menstrual cycle. Feminine cycle (menstruation) frames an ordinary part of a typical cyclic process happening in healthy women among puberty and at the end of the reproductive years [43]. Towards the end of puberty, girls begin to release eggs as part of a monthly period called the female reproductive cycle, or menstrual cycle. A typical menstrual cycle is of 28 days, hormones variations takes place at variety of circumstances. Diagnosis of female infertility starts with a medical history, physical examination and details of menstrual cycle. The female reproductive system is principally regulated by following hormones including estradiol, progesterone, follicle stimulating hormone, and luteinizing hormone. It is a complex process there are different scenarios of hormones in a menstrual cycle like level, secretion, stimulate, release etc. [25].

All women know that their menstrual cycles, ovulation, and fertility are interconnected. Unfortunately, they are very confused as to how and why, which is why myths and misconceptions about menstrual periods and infertility are legion the biggest problem is that many women are not sure how ovulation and menstruation are related. They are often not certain which comes first and believe that if their problem is irregular cycles, they will first need to regularize the periods with medications before they can get pregnant. This is not true. It is ovulation which is the primary event and if an infertile woman's cycles are irregular, this is because the underlying common denominator for both the infertility and the irregular cycles is anovulation, and it is this which will need to be treated. Thus, the equation is: irregular cycles (symptom) = not ovulating (cause) = infertility (result). Unfortunately, because ovulation is an internal event and hard to track, many women still confuse cause and effect [14].

The menstruation related problems are found much more severe among women currently experiencing infertility and among women who ever had experienced infertility problem as compared to menstruation problem experienced by all women in the focused area [5,13,37]. This factor study shows the 80% females are fertile is out of 100%, 10% females are infertility & Regular in Menstruation Cycle and 4% females are infertility & irregular in Menstruation Cycle, 6% females are in protection (Fig. 6).

### D. BMI

Body Mass Index is abbreviated as BMI. Many women in the underweight, overweight, and obese categories will not have a problem becoming pregnant. But women who are not an ideal body weight may have problems with ovulation [23]. This could lead to problems with fertility. A BMI of underweight may cause irregular menstrual cycles and may cause ovulation (release of an egg from the ovaries) to stop. A BMI in the obesity range may also lead to irregular menstrual cycles and irregular ovulation. They include possible thyroid disease, insulin resistance, or Type 2 diabetes. Obese women who have normal ovulation cycles still have lower pregnancy rates than normal weight women [12]. Obesity directly associated with weight loss analogous to hormonal stability or instability affects infertility [35]. Female obesity and underweight are known to adversely affect fertility through alterations of hormone patterns and the menstrual cycle.

Table 1: BMI Standards.

BMI Standard	
Healthy Range	18.5-25
Over Weight	25-30
Under Weight	
Obese	30-35
Severely Obese	Above 35

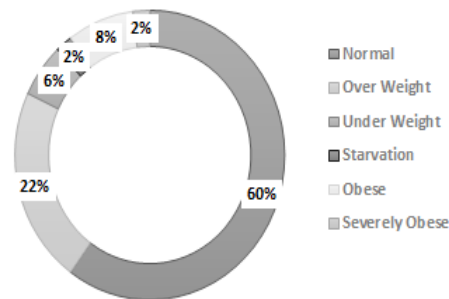
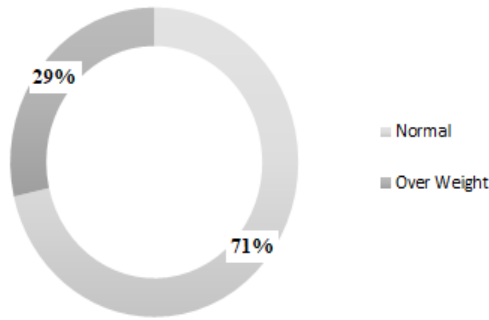


Fig. 7. Body Mass Index Ratio.

BMI is a number calculated by dividing a person's weight in kilograms by his or her height in meters squared [29].

BMI is used in determining obesity. In this BMI study shows 60% is normal, 22% is overweight, 6% is under

weight, 2% is starvation, and 8% is obese, 2% is Severely Obese (Fig. 7). In the BMI and infertility study shows the 71% is normal and 29% is overweight among infertile females (Fig. 8).

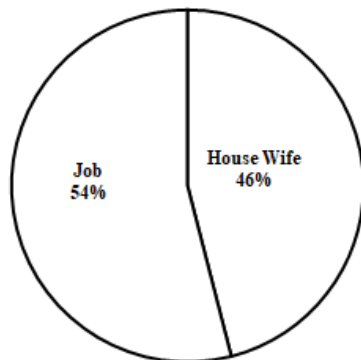


**Fig. 8.** BMI and Infertility.

**E. Profile and Radiation OR Stress and Working Environment**

Believe it or not, our bodies are equipped to prevent conception from occurring during times of extreme stress. The presence of adrenalin, the hormone that is released by our bodies during stressful times, signals to our body that conditions are not ideal for conception. Recent research tells us that stress boosts levels of stress hormones [45], such as adrenaline, catecholamine's and cortisol, which can inhibit the release of the body's main hormone, GnRH (gonadotropin releasing hormone), which is responsible for the release of sex hormones. Subsequently this may suppress ovulation in women, reduce sperm count in men and lower libido in both women and men [20].

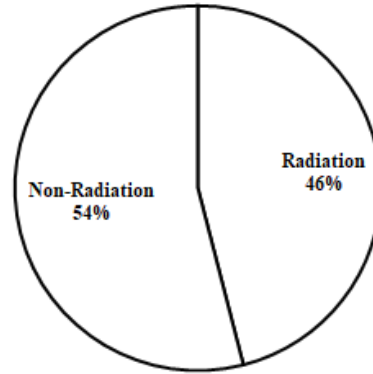
Profile and Radiation is corresponding to stress level and type of working environment, found as major concern regarding new findings. The profile and radiation are affecting the infertility [3,8,12]. In this profile section study the 54 % females are in job including night shift and out of station and remaining 46 % females are housewife. This percentage is found is out of 100% (Fig. 9).



**Fig. 9.** Profile Ratio.

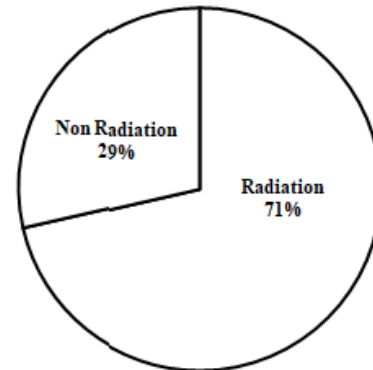
The ability to conceive may be affected by exposure to various toxins or chemicals in the workplace or the surrounding environment [44]. According to the study in working environment 54% females in non-radiation zone including house wife and field job is out of 100% and rest of the 46% females in radiation zone including professions are Computer related job (nurse,

teaching, bank, software engineering and IT professionals) (Fig. 10).



**Fig. 10.** Working Environment Ratio

In this type of working environment and infertility study, 71% females are radiation zone facing problem of infertility and remaining 29% females are non-radiation zone. Hence, it is proved that radiation adversely affects female infertility. It is one of the major factors of female in fertility in urban cities among fertiled aged couples (Fig. 11).



**Fig. 11.** Working Environment and Infertility Ratio.

**F. Economic**

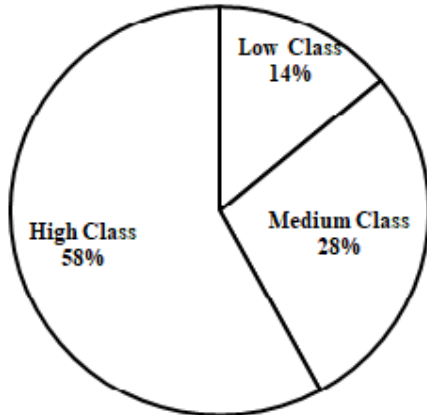
The economic conditions of a country influence fertility considerably. In developed countries, per capita income and standard of living being high, fertility is low. People prefer to maintain their high standard of living instead of having more children which involve high costs in bringing up and educating them. But the poor in developed countries have high fertility because they want more children to support the family. The same is the case in underdeveloped countries both in agricultural and industrial sectors [40]. It is one the crucial aspect while choice of infertility treatment [42,10].

Economic factors like urbanization, occupation of the family and overall economic conditions have much effect on fertility. The economic conditions of a country influence fertility considerably. In developed countries, per capita income and standard of living being high, fertility is low. People prefer to maintain their high standard of living instead of having more children which involve high costs in bringing up and educating them. But the poor in developed countries have high fertility because they want more children to support the family [16,17]. Consider Class Range for the study is as follows.

**Table 2: Considered Economic Classes Range.**

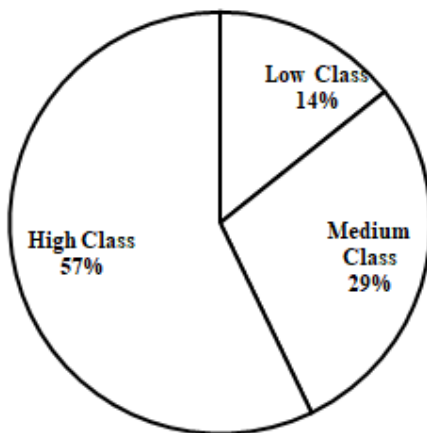
Considered Economic Class Range	
Low	1.5-3 Lkh (per annum.)
Middle	3-5 Lkh (per annum.)
High	Greater than 5 Lkh (per annum.)

According to the study, economic is divided into three classes: high class, medium class and low class. In the economic class percentage 58% in high class, 28% in medium class and 14% in low class (Fig. 12).



**Fig. 12.** Economic Class Ratio.

In the infertile females 57% in high class, 29% in medium class and remaining 14% in low class (Fig. 13).

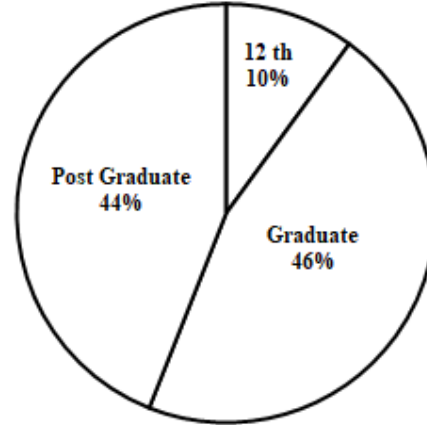


**Fig. 13.** Infertile Females Belongs to Economic Class.

**G. Education**

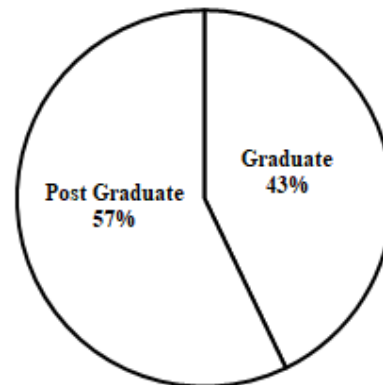
Education plays an important role in influencing fertility. In countries where the percentage of literates is high, fertility is low. That is why the birth rate is low in developed countries. The educated couple prefers a very small family. It understands the use and importance of various family planning devices. Moreover, the span of child-bearing is reduced considerably in the case of a girl who receives education for a number of years and marries at a ripe age [24]. Education plays an important role in influencing fertility. In countries where the percentage of literates is high, fertility is low.

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**Fig. 14.** Education Ratio.

In the education and infertile female 57% females are post graduate and rest of the 43% females are graduate (Fig. 15).



**Fig. 15.** Education and Infertile Females Ratio.

**H. Thyroid (TSH)**

Fertility and reproduction are also controlled by the thyroid gland. An overactive thyroid can lead to premature birth and miscarriage. Malformations can also occur because the thyroid hormones of the mother are essential for the development of the child [1]. Thyroid hormone problem and disproportion is one of the important factors exposed while infertility diagnosis and to sustain pregnancy also [2, 31,34]. According to the data analysis of thyroid in the infertility and TSH 66% females are fertilized, 14% females are pregnant with TSH, 10% females are infertility without TSH, 4% females are infertility with TSH and rest of the 6% females are in protection (Fig. 16).

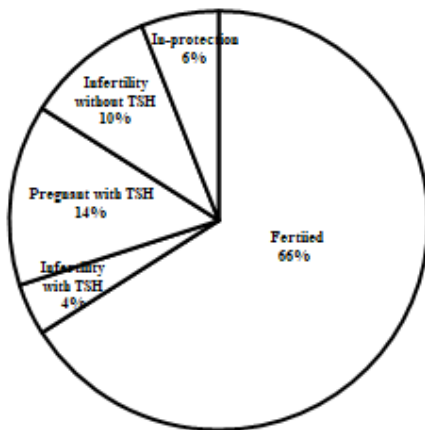


Fig. 16. Infertility and TSH.

In the miscarriage and TSH 54% females are fertilized, 20% females are miscarriage without TSH, 6% females are miscarriage with TSH, 6% females are in protection and remaining 14% females are infertile (Fig. 17).

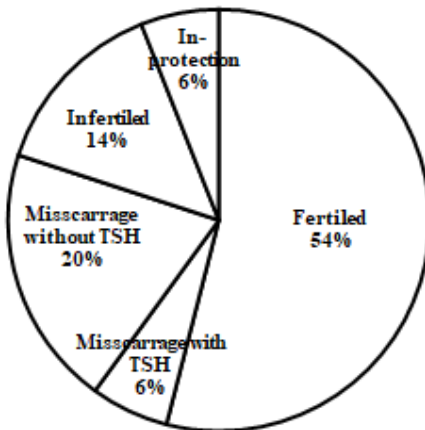


Fig. 17. Miscarriages and TSH.

#### IV. CONCLUSION

Infertility is become a global issue. Medically, female infertility is investigated on hormonal and structural (female reproductive anatomy) or both perspectives. But, now a days, eating pattern and automatic life style are becoming major reason for the aforementioned hormonal perspective. Following are the investigated eight factors Fertility, Age, Menstruation Cycle, BMI, Profile and Radiation OR Stress and Working Environment, Economic, Education and Thyroid (TSH) explores modern living aspects, acquaintances female fertility. Most note able and anxious finding corresponding to electronic living is the profile and radiation. Infertility study corresponding to this type of working environment, 71% females of radiation zone facing problem of infertility. Rest of the findings are equally noticeable and important while female infertility diagnosis.

#### V. FUTURE SCOPE

Female infertility on above factors is investigated to design a fuzzy mathematical model to calculate rate of

female fertility.

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