Healthcare Seeking Behavior of Women with Primary Infertility in Selected Urban Areas of Bangladesh

A thesis submitted for the Degree of ***Doctor of Philosophy***

Submitted by

Farhana Huq
Re-Registration No.: 19/2025-2026`
Registration Number: 20/2019-2020
Department of Population Sciences
Faculty of Social Sciences
University of Dhaka, Bangladesh

Supervised by:

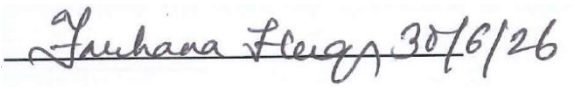
Md. Aminul Haque, PhD
Professor
Department of Population Sciences
Faculty of Social Sciences
University of Dhaka, Bangladesh

June 2026

Dhaka University Institutional Repository

Declaration of the Researcher

I hereby declare that the material embodied in this thesis titled **"Healthcare Seeking Behavior of Women with Primary Infertility in Selected Urban Areas of Bangladesh"** is original and the work has not been submitted partially or fully in any Institute or University for any other degree or diploma.



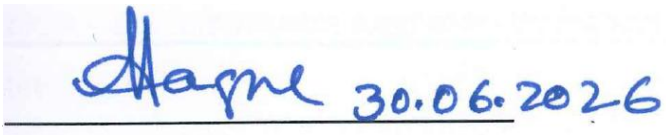
Farhana Huq

PhD Research Fellow
Re-Registration No.: 19/2025-2026`
Registration Number: 20/2019-2020
Department of Population Sciences
Faculty of Social Sciences
University of Dhaka, Bangladesh

Dhaka University Institutional Repository

Certificate of Supervisor

This is to certify that the thesis entitled **"Healthcare Seeking Behavior of Women with Primary Infertility in Selected Urban Areas of Bangladesh"** by Farhana Huq (Re-Registration No.: 19/2025-2026; Registration Number: 20/2019-2020), Ph.D. Research Fellow, Department of Population Sciences at the University of Dhaka, is an original research work completed under my direct supervision and guidance. I am highly confident that the research work maintained a high academic standard, contained substantial information, and, as far as I know, that no part of this work has been submitted to any institute or university for any other Degree or Diploma. I strongly recommend the work for submission in support of the Doctor of Philosophy in Population Sciences degree.



(Supervisor)
Md. Aminul Haque, PhD.
Professor
Department of Population Sciences
Faculty of Social Sciences
University of Dhaka, Bangladesh

Dhaka University Institutional Repository

Acknowledgements

First and foremost, the lord is worthy of all praise. I want to express my sincere gratitude to Almighty Allah for granting me the strength to complete the thesis.

I want to express my gratitude to my research supervisor, Dr. Md. Aminul Haque, PhD, Professor, Department of Population Sciences, University of Dhaka, for his unwavering support for my doctoral studies and associated research. I am thankful to him for his boundless patience, remarkable motivation, and vast knowledge of literature.

I want to convey my gratitude to the authorities of Dhaka University and the chairperson of the Department of Population Sciences for allowing me to study there. I am also thankful to all the faculty members of the Department of Population Sciences. Additionally, my sincere thanks go to Kazi bhai, Farid bhai, Gulzar bhai, and Ali bhai for their support.

I want to express my sincere gratitude and immense indebtedness to Professor Dr. Md. Rabiul Haque, one of my favorite teachers, for his constant, patient guidance and encouragement. I feel proud to express my regards and immense indebtedness to Professor Dr. Abu Hasnat Md. Kishowar Hossain, Department of Population Sciences, University of Dhaka, for his kind cooperation and valuable suggestions throughout the research period and in the preparation of the thesis.

I also take this opportunity to thank my parents, my husband, teachers, and well-wishers for their blessings and prayers. I am deeply thankful to my husband, Dr. Shah Muhammad. Aman Ullah and my children, Shah Saafir Zayan and Suhaira Aman, for their loving support.

Dhaka University Institutional Repository

Acronyms

AMH	:	Anti-Mullerian Hormone
ANC	:	Antenatal Care
ART	:	Assisted Reproductive Techniques
ASRM	:	American Society for Reproductive Medicine
BBT	:	Basal body temperature
BDHS	:	Bangladesh Demographic and Health Survey
BMI	:	Body Mass Index
CDC	:	Centers for Diseases Control
DBCP	:	Dibromo chloropropane
DHS	:	Demographic and Health Survey
FGTB	:	Female Genital Tuberculosis
FP	:	Family Planning
FSH	:	Follicle-Stimulating Hormone
HIV	:	Human Immunodeficiency Virus
HSG	:	Hysterosalpingography
ICSI	:	Intra-cytoplasmic sperm injection
IR	:	Insulin Resistance
IUD	:	Intra-uterine Contraceptive Device
IUI	:	Intra Uterine Insemination
IVF	:	In Vitro Fertilization
LARC/PM	:	Long-Acting Reversible and Permanent Contraceptive Methods
LH	:	Luteinizing Hormone
MS	:	Metabolic Syndrome
MS	:	Metabolic Syndrome
NGOs	:	Non-governmental organization
NSAIDs	:	Non-Steroidal Anti-Inflammatory Drugs
NSFB	:	National Survey of Fertility Barriers
OHSS	:	Ovarian Hyperstimulation Syndrome
OSHA	:	Occupational Safety and Health Administration
PCOs	:	Polycystic Ovary Syndrome
PCR	:	Polymerase Chain Reaction
PID	:	Pelvic Inflammatory Disease
PID	:	Pelvic Inflammatory Disease
PNC	:	Postnatal Care
RTI	:	Reproductive Tract Infections
SDNP	:	Sustainable Development Networking Programme
SPSS	:	Statistical Package for Social Sciences
STD	:	Sexually Transmitted Disease
TCM	:	Traditional Chinese Medicine
TFR	:	Total Fertility Rate
TSH	:	Thyroid Stimulating Hormone
UTI	:	Urinary Tract Infection
WHO	:	World Health Organization

Dhaka University Institutional Repository

TABLE OF CONTENTS

Acknowledgement IV

Acronyms V

Chapter 1: 1

1.1 Introduction 1

1.2 Objectives of the study 5

1.3 Organization of the study 6

Chapter 2: 6

Literature Review 7

2.1 Introduction 7

2.2.1 Healthcare practices 11

2.2.2 Environmental factors 12

2.2.3 Menstrual Cycle Factors and Infertility 14

2.3. Lifestyle Factors affecting Women's fertility 15

2.3.1 Age 15

2.3.2 Tobacco Smoking, Coffee, and Alcohol Abuse 17

2.3.3 Stress/Anxiety 19

2.3.4 Nutrition Styles and Body Weight 20

2.3.5 Environmental Pollutants 20

2.3.6 Nutritional Status, Body Weight, and Reproductive Health 19

2.3.6.1 Malnutrition 21

2.3.6.2 Nutritional Related Diseases: Overweight, Obesity, and Anovulation 20

2.3.7 Polycystic Ovary Syndrome (PCOS) 24

2.3.8 Metabolic Syndrome (MS) 26

2.4: Perceptions of Infertility 26

2.5 Prevalence of Infertility 26

2.6 Rate of Infertility 26

2.7 Risk Factors of Infertility 26

2.8 Infertility scenario worldwide 26

2.9 Primary Infertility scenario in Bangladesh 326

2.10 Social impacts and psychological consequences of Infertility 33

2.11 Impacts of Infertility in Bangladesh 36

Dhaka University Institutional Repository

2.12 Management of Infertility 37
2.13 Impacts of Infertility in Bangladesh 39
2.13.1 Initial Treatment 41
2.13.2 Treatment for infertility caused by Genital TB 43
2.14 Assisted Reproductive Technologies in infertility treatment 43
2.15 Pathways to infertility care in Bangladesh 45
Chapter 3: 47
Methodology 47
3.1 Introduction 47
3.2 Data source and study design 47
3.3 Sample Selection: 48
3.4 Outcome variable 49
3.5 Independent variables 49
3.5 Statistical analysis 49
3.6 Ethical Consideration 50
Chapter 4: 51
Findings 67
4.1 Introduction 67
4.2 Socio-economic and demographic characteristics of the respondents 67
4.3 Mental health 71
4.4 Anthropometric profile of the respondents 57
4.5 Fertility-related and Reproductive Health characteristics 58
4.6 Evaluation of infertility causes and diagnostic findings 49
4.7 Pregnancy-related issues 63
4.8 Primary Infertility-related Treatment-seeking behavior 64
4.9 Infertility-related socio-behavioral consequences 87
Chapter 5: 91
Discussion and Conclusion 91
5.1 Discussion 91
5.2 Strengths and limitations 793

Dhaka University Institutional Repository

5.3 Conclusion..... 78

Appendix-1: Questionnaire..... 81

Appendix-2:EthicalClearance..... 97

References 100

Dhaka University Institutional Repository

List of Tables

Table-2.1: Childlesness and infertility among women 07
Table-2.2: Causes of infertility in different region 09
Table-4.2.1: Distribution of the age of the respondents' 53
Table-4.2.2: Division and community type of the respondents' 54
Table-4.2.3: Marital status,religion and household types of the respondent's 54
Table-4.2.4: Occupation of the respondent's and their husband's 55
Table-4.2.5: Education of the respondents' and their husband's 56
Table 4.2.6: Age at marriage of the respondents 56
Table 4.2.7: Family income and media exposure of the respondents 57
Table 4.3.1: Mental status of the respondents 58
Table 4.4.1: BMI and body weight of the respondents 59
Table 4.4.2: Reasons for obesity of the respondents 59
Table 4.5.1: Marriage, fertility, and reproductive history of the respondents 60
Table 4.6.1: Probable causes for infertility 61
Table 4.6.2: Primary infertility history of the respondents 61
Table 4.6.3: Infertility diagnosis history of the respondents 63
Table 4.6.4: Risk factors associated with infertility 63
Table 4.6.5: Menstrual health conditions of the respondents 64
Table 4.7.1: Pregnancy-related issues of the respondents 65
Table 4.7.2: Types of Health facilities for managing pregnancy outcome 66
Table 4.8.1: Health-seeking behavior of the respondents 66
Table-4.8.2: Types of Healthcare Centers assessed for primary infertility treatment 67
Table 4.8.3: Duration of infertility treatment and numbers of providers visited 67
Table 4.8.4: Treatment-related outcome of the respondents 68
Table 4.8.5: Preference of infertility treatment of the couple 70
Table 4.8.6: Respondents who received treatment in different orders and conceived 70
Table 4.8.7: Percentage of the respondents received different types of infertility treatment 71
Table 4.8.8: Treatment available in health facilities 72

Dhaka University Institutional Repository

Table 4.8.9: Country visited for primary infertility treatment purposes..... 73
Table 4.8.10: Husband's participation during infertility treatment 74
Table 4.9.1: Social, economic, and familial consequences of infertility..... 75
Table 4.9.2: Health-seeking behavior for sub-fertility by their background characteristics.....77

Dhaka University Institutional Repository

List of Figures

Figure 2.1: Hierarchical Decision-Making for Infertility Care in the Public Health Sector.....45

Figure 2.2: Availability and Accessibility of Infertility Services in Bangladesh's Private Sector ... 46

Figure 3.2.1: Flow Diagram of the Study Sample Selection Procedure 50

Figure 4.1: Types of Contraception used by the respondents..... 62

Figure 4.8.1: Proportions of respondents who received treatment for primary infertility 69

Figure 4.8.2: Reasons for not seeking allopathic treatment for primary infertility 73

Dhaka University Institutional Repository

Abstract

Background: In Bangladesh, social and cultural expectations place strong pressure on women to conceive soon after marriage, often leading to emotional distress and social stigma when conception does not occur. Despite advances in reproductive healthcare, many women with primary infertility delay seeking appropriate medical care because of limited awareness, financial constraints, and limited access to specialized services. Traditional beliefs and reliance on informal healthcare providers also shape healthcare-seeking pathways. Improved knowledge in this area can support the development of targeted interventions and policies to enhance access to evidence-based fertility care. In light of these gaps, this study aims to assess healthcare-seeking behaviors and identify the key determinants influencing healthcare utilization among women with primary infertility in Bangladesh.

Methods: A random sampling design was used. This was a quantitative study with a sample size of 421, conducted among reproductive-aged women aged 15-49 who attended infertility services. Descriptive statistics were used to present the characteristics of the study population. Chi-square tests and cross-tabulations were used to identify factors associated with primary infertility and health care-seeking behavior.

Results: A total of 421 Bangladeshi reproductive-aged women were included in this study. Among them, the 20-24 age group (28.5%) is identified as the most fertile period for women. Most women (61.5%) realized difficulty in conceiving within the first 1-2 years, and nearly half (48.2%) sought treatment within one year of recognizing the problem. Most of the respondents (66.3%) reported that they were clinically diagnosed with the causes of infertility; among them, 77.4% had undergone a pelvic examination of the uterus. Most of them had taken a 1- to 2-year gap. 37.9% of them used a family planning method during the gap period. While reporting the reasons for infertility, 41.8% reported irregular menstruation, 27.3% had reported being overweight. Almost all respondents (88.5%) reported “wait and watch” as the primary reason for delaying treatment, while 19.5% cited financial problems and 12.4% were undergoing other treatments. Thirty point nine percent of the participants had a family history of sub-fertility, and 16.9%

Dhaka University Institutional Repository

reported having chronic medical conditions, while 15.4% had pelvic disease or genital infection. When they were asked about delayed initiation of infertility treatment, the majority indicated that they were waiting for a natural pregnancy (44.9%), and nearly half (38.7%) of them reported that they did not feel treatment was necessary. In comparison, 8.4% reported that the treatment was expensive and they could not afford it. Almost all respondents, regardless of treatment number, reported consulting a healthcare provider, but progression through later phases increased with repeated treatments. Women who received more than three treatments were most likely to proceed through subsequent phases, including diagnosis, receiving advice, and using treatment. Moreover, 15.9% experienced psychological violence in the family, whereas 1.2% experienced any physical violence due to infertility.

Conclusion: This study explores the healthcare-seeking behavior of women experiencing primary infertility in Bangladesh. It examines the socio-cultural and healthcare system factors that influence their decisions to seek medical care. The research highlights the delay in treatment and the impact of stigma and limited awareness on infertility at all levels. The findings aim to inform policies and interventions to improve access to appropriate reproductive healthcare services for affected women.

Dhaka University Institutional Repository

CHAPTER 1:

1.1 Introduction

Infertility, the inability to produce a child, as a critical determinant of fertility, infertility is an essential parameter for examining fertility patterns across different social and demographic settings. If fertility refers to "live births" (Preston et al. 2001), infertility is naturally an antonym, referring to the absence of another birth. Indeed, Larsen (2005, p. 846) noted that "infertility" is usually defined demographically as "the inability of a non-contraception, sexually active woman to have a live birth." In contrast to the medical definition, the demographic emphasis is on the inability to have another live birth rather than the inability to conceive. Given that fertility research is mainly concerned with fertility behavior rather than the emotional and social dimensions of infertility, most available datasets identify infertility based on the absence of a live birth after three, five, or seven years of exposure to sexual intercourse (Larsen 2005; Rutstein and Shah 2004). "Sterility" is often measured by the proxy of married women being zero-parity at the end of their reproductive years; the demographic terms "sub-fecundity" or "infecundity" are typically more in line with the clinical definition of "infertility" (King 2003; Preston et al. 2001), indicating a reduced capacity to conceive, but not necessarily permanent inability. National Survey of Fertility Barriers (NSFB) data show a lifetime infertility prevalence of 47.1% among US women aged 25–45, based on whether women have ever met the 12-month medical definition (ASRM 2008). Women with both primary and secondary infertility were included in the study, regardless of their reproductive intentions, whether actively pursuing pregnancy, not attempting conception, or expressing no particular preference. The terms 'infertility', 'sub-fecundity', 'infertility', 'childlessness', and 'unresolved infertility' were used almost synonymously, and there was a significant disparity in terms of the duration of attempting pregnancy, age group of women included, and denominator used to calculate prevalence rates. 'Impaired fecundity' is defined as 'women of any marital status who are not surgically sterile with problems conceiving or carrying a pregnancy to term and unable to conceive after three years of unprotected intercourse' (Chandra and Stephen, 1998). The definition of infertility used by some studies included 'absence of live birth despite being married for 5 or 7 years' with no consideration of whether this was

Dhaka University Institutional Repository

voluntary or involuntary (Larsen, 2000, 2003; Liu *et al*, 2005). On a global scale, an estimated 8.0%–15% of couples experience infertility, although the proportion may reach or exceed one-third in some populations (Sciarra J, 1994; WHO 1991). The World Health Organization (WHO) estimates that over 180 million couples in developing countries experience either primary or secondary infertility. According to a systematic review, the prevalence of current infertility is 3.5%–16.7% in developed countries and 6.9%–9.3% in less developed countries. Determining the burden of infertility in each country is vital for evidence-based policy development, but this depends on accurate measurement of primary infertility. Inconsistencies in defining primary infertility and challenges in identifying both infertile women and the population at risk of pregnancy can significantly influence estimates of prevalence and associated factors (Smith, J., & Doe, A., 2014).

According to the Centers for Disease Control and Prevention (CDC), approximately 1.5 million women in the United States (6.0%) experience infertility, and about 25.0% of infertile couples have multiple contributing factors (National Survey of Family Growth-CDC, 2006-2010). Global estimates using a 12-month definition report a median infertility prevalence of 9.0%, ranging from 3.5% to 16.7% across countries (Boivin et al. 2007). It is estimated that 8.0–10.0% of couples in the UK (NICE guideline, 2018) or 8.0–12.0% worldwide (RHO archives, 2002) experience some form of infertility. The Centers for Disease Control and Prevention (CDC) reports that about 1.5 million women in the United States, representing 6.0%, experience infertility, while one-quarter of infertile couples have more than one contributing cause (National Survey of Family Growth-CDC, 2006-2010). According to a large-scale survey in sub-Saharan Africa, the national prevalence of infertility varies between 12.5% and 16.0% (Larsen, 2000). Inhorn also refers to parts of central and southern Africa as an “infertility belt,” with rates reported to be as high as 32.0% in Namibia (Larsen, 2000). Inhorn has described areas of central and southern Africa as ‘the infertility belt’ with prevalence as high as 32.0% in Namibia (Inhorn MC, 2003). In Sub-Saharan Africa, fertility studies often describe a so-called “infertility belt,” which includes central and southern African countries characterized by some of the world’s highest infertility levels (Feldman-Savelsberg, 2002; Frank, 1983; Frank and Mc Nicoll, 1987; Larsen, 1994). However, addressing and managing infertility is often a low priority in developing countries due to the

Dhaka University Institutional Repository

emphasis on fertility reduction and limited resources for treatment services (Daar and Merali 2001). In India, an estimated 8 to 10 million couples are childless. According to the Delhi IVF Fertility Research Centre, infertility affects one in six couples in India (Dutta et al,2007), according to the latest National Family Health Survey (NFHS), an estimated 3.8% of currently married women aged 40–44 years remain childless (India National Family Health Survey,1998-1999). The actual rate of infertility in Bangladesh remains unknown; however, the World Infertility Survey reported 4.0% and 15% among women aged 45–49 years, representing the end of the reproductive age span (M Vaessen 1984; D Kumar 2007).

Although infertility affects both men and women, women in many developing countries disproportionately bear the social consequences of childlessness. Prevailing gender norms frequently attribute infertility to women, irrespective of its actual cause. In several societies, infertility is regarded as a socially acceptable ground for marital dissolution initiated by the husband (Robert et al., 1993). Infertility is a prevalent and serious health condition with far-reaching consequences that extend beyond reproductive capacity, impacting emotional, psychological, economic, family, and social well-being (Douglas TC, 2007). Due to differences in infertility care, socio-cultural values, and attitudes toward childlessness, the gap between the developed and developing worlds is emerging (Willem O, 2011). According to the Indian Society of Assisted Reproduction, infertility affects approximately 10–14% of the Indian population, with a higher prevalence in urban areas, where nearly one in six couples experiences infertility. It is estimated that around 27.5 million couples actively trying to conceive are affected in India. Beyond its clinical implications, infertility has profound social and interpersonal consequences, contributing to marital strain, stigma, and psychological distress. Despite its widespread impact, infertility remains an under-researched public health issue with significant implications for individuals, families, and society (Neeta Lal, 2018).

The real scenario is that there is little data available on infertility in recent research in Bangladesh. According to the Bangladesh Demographic Health Survey (BDHS 2017-2018), priority has been given to fertility, fertility preferences, fertility regulation, family planning, and other health issues, where infertility is a critical issue for couples, and females are often stigmatized more than

Dhaka University Institutional Repository

their male counterparts in this country, which is totally unaddressed. Surprisingly, there is no chapter on health-seeking behavior of infertility in the new edition of the Bangladesh Demographic Health Survey (BDHS 2022). In the last edition, the chapter on women's empowerment and health-seeking behavior was missing, leaving no information on health-seeking behavior regarding infertility. Reproductive health care under Women's empowerment includes indicators on ANC, delivery, PNC, etc., but infertility is not mentioned anywhere and is not considered a useful indicator for women's empowerment (BDHS 2014). Fertility Determinants in Bangladesh have shown varied trends and determinants, including age-specific fertility rate, the TFR trend in Bangladesh, and comparisons of TFR by division. Still, infertility-related data and information were entirely missing, and no comparative study was found at the divisional level (Bangladesh Bureau of Statistics, 2015). Childlessness is associated with a wide range of social, economic, and emotional challenges worldwide. In Bangladesh, studies have shown that both illiterate rural women from low-income households and educated urban middle-class women without children experience stigma, guilt, perceived role failure, low self-esteem, family abandonment, social isolation, and economic hardship. Although urban childless women generally report better living conditions and greater access to resources than their rural counterparts, women in both groups experience considerable frustration and psychological distress related to childlessness (N. Papreen et al., 2011).

The incidence of infertility is increasing in Bangladesh. Still, we can learn very little about the miserable consequences of infertility and can draw a scenario of infertility comparing rural and urban contexts. Approximately 15.0% of couples of reproductive ages who desire to have children experience infertility. Delayed marriage and childbearing, inadequate access to quality reproductive healthcare, poor health and hygiene conditions, and delayed or inappropriate treatment may contribute to infertility or its persistence. Timely diagnosis and effective management are often hindered by low socioeconomic status, limited awareness of reproductive health, social stigma and cultural taboos, and reliance on unqualified healthcare providers, particularly in rural areas. Misinformation disseminated through unreliable media sources, misleading advertisements, and unverified publications can adversely influence couples seeking infertility care by promoting ineffective or inappropriate treatments. In addition, delays in

referral to specialized reproductive healthcare services may occur, even within the formal healthcare system, limiting timely access to appropriate diagnosis and evidence-based treatment. Comprehensive evaluation using appropriate diagnostic procedures, including hysterosalpingogram, laparoscopy, semen analysis with sperm preparation techniques, and relevant hormonal and immunological investigations, together with careful clinical interpretation of the findings, can facilitate accurate diagnosis and timely, cost-effective management of infertility (Dr. Bashed, 2019). There are very few studies related to infertility especially with the issues of primary infertility in Bangladesh. Considering the lack of relevant national data, the unexplored aspects of the consequences and treatment-seeking patterns of infertility, and the lack of modern treatment facilities at all levels, I have grown interested in studying this issue. This study's purpose is to identify the probable factors responsible for primary infertility among urban females and their health care-seeking behavior for both their health and fertility problems.

Previous researchers have focused on Infertility and its causes, the global scenario of infertility, the impact of infertility on conjugal life, the social impact of infertility, and so on, but no research has examined the actual infertility scenario and the prevailing health-seeking system in Bangladesh. Few studies examine the overall rural health-seeking system, and none specifically address infertility in Bangladesh or urban healthcare-seeking patterns in this country. There is a remarkable gap in the research on primary infertility in our country. The study is designed to address the knowledge gap regarding primary infertility and to ascertain the possible causes of this condition, as well as health-seeking behavior.

1.2 Objectives of the study

The overall objective of the study is to know the possible factors responsible for primary Infertility (PI) and the health care-seeking behavior to overcome infertility of females living in urban areas.

Specific Objectives are as follows:

1. To know the causes of primary infertility;
2. To know the risks associated with primary infertility;
3. To know the socio-economic factors associated with primary infertility;

Dhaka University Institutional Repository

4. To know the possible treatment-seeking behavior of the urban female with primary infertility.

1.3 Organization of the study

This study is divided into five chapters. The first chapter includes the introduction, objectives, and organization of the study. In the second part, the literature is reviewed to explain factors associated with infertility, the treatments available in the country and globally, and to develop a conceptual framework. The third chapter deals with the research methodology: sample size, research design, dependent variables, independent variables, and statistical analysis, which are adopted to conduct the study. The fourth chapter presents the study findings. In the fifth chapter, the findings are discussed. The last chapter also includes strengths and limitations, policy recommendations, and a conclusion.

Dhaka University Institutional Repository

CHAPTER 2:
LITERATURE REVIEW

2.1 Introduction

In this chapter, the literature was reviewed regarding the definition, causes, and factors of infertility among reproductive-age women. A conceptual framework has also been developed for better understanding.

In English demographic terminology, primary infertility is defined as “the inability to bear any children, either due to the inability to conceive or the inability to carry a pregnancy to a live birth.” In medical studies, however, infertility is usually defined only as “the inability to conceive”. In English demographic language, the term “Infecundity” refers to” the inability to conceive after several years of exposure to the risk of pregnancy”.” Inability to conceive within two years of exposure to pregnancy “is the epidemiological definition recommended by the World Health Organization (WHO, 1975; WHO, 2001). Infertility is divided into three main groups: primary infertility, secondary infertility, and lifetime infertility. Primary infertility is defined in various ways depending on the duration of the period of unsuccessful conception. In clinical definition, infertility is referred to as “the lack of fertility after one year of consistent and unprotected sexual intercourse.” Epidemiologists often consider a two-year period when defining infertility. This is based on the observation that a proportion of couples who are classified as infertile after one year of attempting conception may conceive spontaneously within the second year. As a result, epidemiological definitions tend to be more cautious in classifying infertility. In the adjusted definition of infertility in 2008 by the American Society for Reproductive Medicine (ASRM),” infertility is referred to as the failure to become pregnant after 12 months or more of continuous and unprotected sexual intercourse.” It is suggested that a number of couples identified as infertile after one year of attempting conception may conceive during the second year. Consequently, a more circumspect definition of infertility is adopted. Secondary infertility can be defined as “couples who have been pregnant at least once but are

Dhaka University Institutional Repository

not able to get pregnant when they attempt to conceive again." Lifetime infertility was defined as "having any delay (more than one year) to get pregnant during their life, regardless of whether they have had a child" (Bornstein *et al.*, 2023).

Table 2.1 shows prevalence of childlessness among currently married women aged 40–44 and 25–49 years with a minimum marital duration of five years, including the percentage with no living children and no fertile pregnancies (Demographic and Health Surveys, 1994–2000)

Table 2.1: Prevalence of Childlessness and Infertility among Women(Aged 40–44 and 25–49 Years)

Country	No Living Children		No Fertile Pregnancies	
	Age 40-44	Age 25-49	Age 40-44	Age 25-49
Sub-Saharan Africa				
Cameroon	7.3	6.6	3.7	4.4
Central African Republic	10.5	9.3	7.3	6.4
Ghana	1.1	2.5	0.6	2.0
Guinea	3.0	4.5	1.9	2.6
Mozambique	3.1	6.0	1.9	3.3
Kenya	1.5	1.6	1.5	1.3
Tanzania	2.8	4.0	2.0	2.8
Uganda	3.2	4.2	1.9	3.0
Zambia	2.3	3.6	1.5	1.9
Ghana	1.1	2.5	0.6	2.0
North Africa/West Asia				
Turkey	1.8	3.2	1.5	2.8
Egypt	2.8	3.1	2.6	2.7
Yemen	2.5	2.5	2.2	2.1
Central Asia/South and Southeast Asia				
Bangladesh	1.8	6.0	1.1	4.0
India	2.6	3.1	2.0	2.5
Indonesia	3.7	3.2	2.9	2.6
Nepal	3.2	3.3	1.4	2.2
Philippines	1.6	2.3	1.4	2.0
Vietnam	0.9	1.3	0.8	1.1
Latin America/Caribbean				
Bolivia	1.1	1.2	0.7	0.8
Brazil	3.3	3.7	2.9	3.4
Colombia	2.5	2.9	2.3	2.6

Source: Rustein and Shah, 2024

Dhaka University Institutional Repository

In this report, the term “childless” refers to women who have no living children at the time of the survey. Among women aged 40–44 who have been married for at least five years, the lowest levels of childlessness are observed in four countries: the Kyrgyz Republic (0.5%) and Uzbekistan (0.9%) in Central Asia, Vietnam (0.9%) in Southeast Asia, and Peru (0.9%) in South America. Thirteen countries report childlessness rates ranging from 1.0% to 1.9%. In contrast, rates of 4.0% or higher are observed in only six countries, all located in sub-Saharan Africa: Chad and Niger (4.4%), Madagascar (4.7%), Comoros (5.5%), Cameroon (7.3%), and the Central African Republic (10.5%).

The second column of Table 2.1 presents the level of childlessness among women aged 25–49 years. Comparing the two age groups (25–49 and 40–44 years) provides insight into patterns of childlessness, which may reflect underlying changes in health and reproductive conditions affecting both parents and children. On average, childlessness is 0.7 percentage points higher among women aged 25–49 than among those aged 40–44. In 16 countries, the difference is 1.0 percentage point or more, with most of these countries located in sub-Saharan Africa. The largest differences are observed in Bangladesh (4.2 percentage points) and Mozambique (2.9 percentage points).

2.2 Factors Influencing Infertility

Causes of infertility are broadly classified into two categories. The first includes anatomic, genetic, hormonal, and immunological disorders, often referred to as the “core” causes of infertility. These account for approximately 5.0% of cases, and their prevalence is relatively consistent across populations worldwide. The second category comprises preventable causes, which vary considerably across regions and are largely related to infections and iatrogenic factors. In Africa, nearly 85% of infertility cases are attributed to infections, a proportion that is more than double that reported in other regions (Table 2.2). The type and transmission of infections differ between countries and are influenced by social conditions, healthcare infrastructure, medical practices, and environmental factors. Iatrogenic causes account for approximately 5.0% of infertility cases in Western Europe compared with 15.5% in Africa.

Table 2.2 Causes of Infertility in Different Regions

Developing countries across the world			
	Africa	**Asia**	**Latin America**
Female cause			
No demonstrable reason	16	31	35
Tubal infertility	85	39	34
Ovulatory dysfunction	36	34	31
Endometriosis	1	10	3
Male cause			
No demonstrable reason	46	58	41
Infection related	38	24	44

Source: Rustein and Shah 2004

In sub-Saharan Africa, sexually transmitted diseases (STDs) account for more than 70.0% of pelvic inflammatory disease cases, with Chlamydia trachomatis and Neisseria gonorrhoeae being the most common causative organisms. Of these, Neisseria gonorrhoeae typically causes an acute infection of the fallopian tubes that often requires prompt medical attention or hospitalization, thereby facilitating earlier diagnosis. In contrast, Chlamydia trachomatis infections are frequently asymptomatic or mild and may remain undetected until infertility investigations are undertaken. These infections also contribute to male factor infertility and are associated with postpartum and post-abortal infections. In addition, HIV infection is linked to infertility in both sexes, causing tubal damage in women and impaired spermatogenesis in men, either directly or through increased susceptibility to other sexually transmitted infections.

Genital tuberculosis represents another important cause of infertility in both men and women in the Indian subcontinent. Female genital tuberculosis (FGTB) is an important cause of significant morbidity and both short- and long-term sequelae, particularly infertility. In India, its incidence among infertility cases is reported to range from 5.0% to 15.0%. The causative organism is Mycobacterium tuberculosis. The fallopian tubes are most frequently affected (90.0–100.0% of cases), followed by the endometrium (60.0–80.0%), ovaries (around 30.0%), and cervix (approximately 15.0%). Involvement of the vagina and vulva is rare, occurring in about 1.0–2.0% of cases. The prevalence of genital tuberculosis among infertility cases varies widely across

regions, being reported as 1.0% in infertility clinics in the United States, 1.4% in Sweden, 3.1% among gynecological admissions in Malaysia, 3.5–23.0% in Pakistan, and approximately 0.8% (2% among tubal factor infertility) in Italy, The prevalence of female genital tuberculosis (FGTB) among infertility patients has been reported as 4.2% in Saudi Arabia, 16.7% in Nigeria, 6.15%–21.1% in South Africa, and 1.0%–19.0% in different regions of India. FGTB predominantly affects younger women in developing countries, typically within the age range of 20–40 years, whereas in developed countries it is more commonly diagnosed in premenopausal women over 40 years of age. This variation may be attributed to earlier marriage and childbearing in developing settings compared with developed regions. Early diagnosis is essential for timely management and for preventing complications such as fibrosis and infertility, and a high index of clinical suspicion is therefore required. A positive family history of tuberculosis and HIV seropositivity are important risk factors. Although polymerase chain reaction (PCR) can assist in diagnosis, it may yield false-positive results and should not be used in isolation. Laparoscopy and hysteroscopy remain the gold standard diagnostic modalities for confirming the disease (Sharma et al., 2016). `

2.2.1 Healthcare practices

Despite being largely preventable, unsafe abortion remains a major public health concern affecting women worldwide. A World Health Organization report (2006) estimated that in 1995 there were approximately 26 million legal and 20 million illegal abortions globally. In developing countries, 97.0% of abortions were classified as unsafe, with 55.0% occurring in South Asia. Unsafe abortion is associated with significant morbidity, with 20.0–50.0% of women experiencing immediate complications such as hemorrhage, sepsis, or trauma, and 20.0–30.0% developing upper genital tract infections that may lead to infertility. Overall, unsafe abortion is estimated to contribute to approximately 2.0% of infertility cases.

Unhygienic obstetric practices in developing countries also represent an important contributor to infertility. In parts of sub-Saharan Africa, only about 40.0% of births are attended by skilled health personnel, increasing the risk of postpartum infections and long-term reproductive complications. Additional iatrogenic factors include the continued use of outdated procedures

such as dilatation and curettage and cervical cauterization for infertility management, as well as harmful traditional practices involving the insertion of herbs and chemical substances into the vagina. These risks are further compounded by inadequate availability of trained healthcare providers, limited laboratory and diagnostic facilities, and shortages of essential medications.

Female fertility may be adversely affected by opiate use, whether prescribed for chronic pain or used recreationally. In addition, commonly used over-the-counter medications are widely consumed globally. Non-steroidal anti-inflammatory drugs (NSAIDs), including aspirin, ibuprofen, and naproxen, alleviate pain by inhibiting enzymes involved in prostaglandin synthesis. Prostaglandins play an essential role in female reproduction, particularly in ovulation and implantation, as their levels rise in the pre-ovulatory phase. The degree of inhibition of prostaglandin synthesis varies among NSAIDs, with aspirin generally having the least effect and naproxen the greatest potential impact. Routine use of low-dose aspirin in otherwise healthy women attempting conception is not recommended. However, low-dose aspirin, often in combination with low-molecular-weight heparin, may be beneficial for women diagnosed with antiphospholipid antibody syndrome and should be administered under specialist obstetric care (Angela Thable et al, 2020).

2.2.2 Environmental factors

Human reproduction is a complex process, and a variety of factors can interfere with the ability to achieve a healthy pregnancy and birth. Although not all risk factors for infertility are modifiable, certain lifestyle and environmental exposures can be managed to reduce risk (Texas Fertility Center, n.d., 2026). Industrial chemicals, environmental pollutants, and ionizing radiation are among the recognized contributors to infertility, though they are often difficult to avoid due to widespread exposure in daily life.

Heavy metals such as lead, mercury, and boron have been associated with adverse effects on both male and female reproductive health. Lead, found in batteries, metal products, paints, and pipes, can disrupt the hypothalamic–pituitary axis, alter hormone levels, reduce sperm quality, and contribute to menstrual irregularities in women. Boron, used in the manufacture of glass,

Dhaka University Institutional Repository

ceramics, and leather, has also been linked to disturbances in hypothalamic–pituitary function. Mercury, present in thermometers, batteries, and industrial emissions, can enter the food chain through contaminated seafood and bioaccumulate in human tissues, thereby exerting toxic effects on reproductive function.

Air pollution results from the release of particulate matter and ground-level ozone into the atmosphere, along with gaseous pollutants such as carbon monoxide, Sulphur dioxide, and nitrogen dioxide. These contaminants primarily originate from vehicle emissions, fuel combustion, and industrial activities. Air pollution has been shown to affect multiple physiological systems, including reproductive function. However, it is difficult to isolate the effects of individual pollutants because exposure typically occurs as a complex mixture of substances. Moreover, the precise biological mechanisms through which air pollution influences fertility remain incompletely understood. Available evidence suggests that these pollutants may interfere with the development and function of both male and female gametes (Kate Dudek, May 5, 2020).

There are some of the most common environmental factors mentioned, which are responsible for female infertility, which can affect the ability to conceive or lead to issues like miscarriage or congenital disabilities in the child.

- Ethylene oxide, a chemical used in certain sterilizing agents for medical equipment and in some pesticide formulations, has been associated with an increased risk of miscarriage and congenital anomalies following exposure.
- Di bromo chloropropane (DBCP), previously used as a pesticide, has also been linked to adverse reproductive outcomes, including ovarian dysfunction and premature ovarian failure.
- In addition, medical treatments such as chemotherapy and radiotherapy can have gonadotoxic effects, impairing spermatogenesis in males and leading to ovarian damage and reduced fertility in females (Texas Fertility Center, n.d., 2026).

Alcohol, tobacco, and caffeine consumption have all been associated with adverse effects on fertility and are widely used in many developing countries. Alcohol is among the most commonly

consumed psychoactive substances worldwide and has been linked to several reproductive risks. In women, chronic and prolonged alcohol use may contribute to menstrual irregularities, reduced ovarian reserve, and an increased risk of early menopause. Even moderate alcohol intake has been associated with reduced success rates in infertility treatment, potentially due to alterations in endogenous hormone levels and impaired endometrial receptivity.

Caffeine is present in coffee, tea, carbonated beverages, energy drinks, and chocolate, and it is the most widely consumed psychoactive stimulant worldwide. In several cultures, particularly in parts of the Middle East, coffee consumption also holds significant social and traditional value. During pregnancy, health authorities such as the European Food Safety Authority recommend limiting caffeine intake to around 200 mg per day, while the World Health Organization suggests an upper limit of approximately 300 mg per day, equivalent to two to three cups of coffee. These recommendations are based on evidence linking high caffeine intake with an increased risk of miscarriage. Although the underlying mechanisms are not fully understood, proposed explanations include alterations in endogenous hormone levels and impaired uteroplacental blood flow (Kate Dudek, May 5, 2020). Dietary deficiencies of iodine and selenium have been associated with infertility, as has exposure to dietary aflatoxins. Conversely, in some developing countries, contraceptives are mistakenly believed to cause infertility, leading to their rejection or avoidance despite the lack of scientific evidence supporting such claims (Sharkey and Zaidi, 2019).

2.2.3 Menstrual Cycle Factors and Infertility

Menstrual cycles in women result from coordinated physiological and hormonal processes involving the hypothalamic–pituitary–ovarian axis. A typical menstrual cycle is commonly described as lasting approximately 28 days, with menstrual bleeding of 3–5 days characterized by bright or dark red blood. Disruptions in hormonal balance can lead to variations in cycle characteristics. For example, advanced ovarian aging may shorten the luteal phase, resulting in cycles of less than 28 days, whereas altered secretion patterns of follicle-stimulating hormone (FSH) and luteinizing hormone (LH) during the follicular phase may prolong cycle length beyond 31 days. Dysregulation of the hypothalamic–pituitary–ovarian axis, as well as extremes of body weight, can increase the risk of anovulation and contribute to irregular cycle patterns.

Menstrual cycle length has been identified as a potential indicator of reproductive health and fecundability. Irregular cycle length may reduce the likelihood of conception within a given cycle and is therefore associated with subfertility. For instance, one study reported that women with cycle lengths of less than 26 days had approximately half the likelihood of giving birth compared with those with cycle lengths greater than 34 days. Another study found that longer cycles (greater than 31 days) were associated with reduced fecundability. In addition to cycle length, menstrual blood characteristics such as color and consistency have also been considered in assessments of reproductive health. Physiologically, menstrual blood consists of vaginal and uterine secretions, endometrial tissue, red blood cells, and cellular components including mesenchymal stem cells.

In contrast to Western medicine, Traditional Chinese Medicine (TCM) adopts a more holistic and integrative approach to the assessment of menstrual cycles. In TCM practice, menstrual blood characteristics such as color, consistency, duration, and cycle frequency are all considered important diagnostic indicators of a woman's reproductive health. Regulation of the menstrual cycle is regarded as a central principle in TCM-based infertility management. Research conducted in Australia reported that women receiving TCM treatment for infertility experienced changes in menstrual patterns within one to three months, including regulation of cycle length as well as alterations in menstrual blood color and texture. In the same study, nearly half of the participants subsequently achieved pregnancy following TCM therapy (Liu et al., 2022).

2.3 Lifestyle Factors affecting Women's fertility

2.3.1 Age

Among the various demographic factors associated with infertility, advancing maternal age is one of the most significant determinants. In modern societies, increasing numbers of women are postponing childbearing until their late reproductive years due to educational, career, and socioeconomic considerations. However, female age has a substantial influence on the likelihood

of spontaneous conception, with fertility beginning to decline from approximately 25–30 years of age. This age-related reduction in fertility is primarily attributable to the progressive decline in ovarian reserve and deterioration in oocyte quality. Consequently, the global trend toward delayed childbearing is expected to contribute to a growing prevalence of involuntary childlessness and infertility (Sharkey and Zaidi, 2019).

Infertility is a significant reproductive health concern that can have profound emotional, psychological, and social consequences for affected couples and their families. Reproductive capacity is closely associated with age, particularly in women. In females, germ cell proliferation ceases by approximately 20 weeks of fetal development, resulting in a finite pool of primordial follicles that is established before birth. Unlike women, men continue to produce sperm throughout adult life, advancing age is associated with a gradual decline in sperm quality and reproductive function rather than sperm production itself. At birth, the ovaries contain approximately 5 million primordial follicles, which decline to around 500,000 by the onset of menarche. Thereafter, the follicular reserve continues to diminish through the process of follicular atresia, decreasing to approximately 25,000 follicles by the age of 37 years and to nearly 1,000 follicles at the time of menopause. This progressive depletion of the ovarian reserve contributes to the age-related decline in female fertility. Female fecundity declines progressively with advancing age, with a gradual reduction beginning around 32 years of age and a more pronounced decline after 37 years. The natural monthly fecundity rate, which is approximately 25.0% among women aged 20–30 years, decreases to less than 10.0% after the age of 35. Advancing maternal age is also associated with an increased risk of both gynecological and obstetric complications. Older women are more likely to experience spontaneous miscarriage, primarily due to chromosomal abnormalities such as aneuploidy, as well as pregnancy-related complications including preeclampsia, preterm birth, and intrauterine growth restriction. The decline in fertility is largely attributable to a diminished ovarian reserve, which may occur as a normal physiological consequence of aging or as a result of premature ovarian insufficiency. Therefore, healthcare providers should recognize the impact of advancing female age on reproductive outcomes, provide timely counseling regarding age-related fertility decline, and consider early referral to infertility specialists when appropriate.

Maternal age is considered one of the most important indicators of ovarian reserve, as it reflects both the quantity and quality of oocytes. With advancing age, ovarian reserve progressively declines, resulting in a reduced number of retrievable oocytes during in vitro fertilization (IVF) cycles. In addition, embryos derived from oocytes of older women generally exhibit lower implantation potential, leading to reduced pregnancy success rates. The age-related deterioration in oocyte quality is also associated with an increased risk of adverse reproductive outcomes, including higher rates of miscarriage and a greater incidence of chromosomal abnormalities and congenital anomalies among offspring (J Hum, NCBI, 2010).

Female fertility is strongly influenced by age, with peak reproductive potential occurring during the third decade of life. Fertility gradually declines throughout the 30s and decreases more rapidly after the age of 35. A healthy woman aged 30 years has an estimated 20.0% chance of achieving pregnancy in a single menstrual cycle, whereas by the age of 40, the probability declines to less than 5.0% per cycle. Although the average age of menopause is approximately 51 years, the ability to conceive and sustain a successful pregnancy typically declines substantially during the mid-40s, well before the onset of menopause. The age-related decline in fertility affects both natural conception and the success of assisted reproductive technologies, including in vitro fertilization (IVF). Despite advances in fertility treatment, increasing maternal age remains one of the strongest predictors of reduced treatment success. This decline is primarily attributed to the progressive reduction in both the quantity and quality of oocytes, which leads to diminished ovarian reserve, impaired embryo development, lower implantation rates, and an increased risk of pregnancy loss and chromosomal abnormalities (American Society for Reproductive Medicine, 2012).

2.3.2 Substance Abuse

According to the World Health Organization (WHO), 250 million women smoke worldwide. Average rates are far higher in developed countries (22.0%) compared to developing countries (9.0%). Smoking is unhealthy on many levels, but in terms of fertility, it disrupts ovarian function and reduces the ovarian reserve. Typically, women who smoke go through the menopause

between one and four years earlier than non-smokers. Women who smoke more than 20 cigarettes a day have lower progesterone levels during the luteal phase of their menstrual cycle, which can serve as a marker of anovulation. Without ovulation, fertilization is not possible. Women who stop smoking double their chances of getting pregnant. The chemicals found in cigarette smoke can also compromise the uterine environment, making it inhospitable for embryo implantation and growth. Tobacco smoke also contains carcinogens, or cancer-causing substances. Carcinogens damage DNA, the basic building material found in all cells of the human body, including the germ cells that give rise to sperm and egg cells. Thus, smoking can have a direct effect on the health of the reproductive sex cells. It is also important to consider the impact of passive smoking. In addition to contributing to male fertility issues, having a partner who smokes heavily can have reproductive consequences for the female who is regularly exposed to secondhand smoke, even if she does not smoke herself. Passive smoke exposure can be almost as detrimental as direct smoke inhalation and increases the risk of miscarriage, premature labor, and birth defects (Kate Dudek, May 5, 2020). Cigarette smoking has detrimental effects on reproductive health in both women and men. In women, smoking is associated with accelerated depletion of the ovarian reserve, reduced fecundity, delayed conception, an increased risk of spontaneous miscarriage, and lower success rates following assisted reproductive technologies (ART). In men, smoking adversely affects semen quality by significantly reducing sperm motility and the proportion of sperm with normal morphology, thereby contributing to impaired fertility (Sharkey and Zaidi, 2019).

Alcohol is one of the most widely used recreational substances worldwide and is associated with multiple reproductive risks. That women who drink alcohol should consider if they are planning to start a family. Chronic, prolonged alcohol use can lead to menstrual cycle disturbances and a reduced ovarian reserve. There is a proven link between alcoholism and early menopause. Even moderate alcohol use reduces the success rates of infertility treatment, possibly due to an alteration in endogenous hormone levels and reduced endometrial receptivity. There is a suggested link between alcohol consumption and miscarriage, and, although studies performed to date have given conflicting results, the best advice is for pregnant women to completely abstain from alcohol and for all women to limit their intake whilst trying to conceive.

Caffeine is found in coffee, tea, carbonated drinks, energy drinks, and chocolate. It is the most widely consumed psychostimulant worldwide, and drinking coffee is considered a cultural tradition in many Middle Eastern countries. Pregnant women are advised to limit their caffeine consumption to between 200mg (European Food Safety Authority) and 300mg (WHO) a day, which equates to two to three cups of coffee. This is because of an increased risk of miscarriage in those who regularly consume high quantities of caffeine. It is not fully understood why caffeine increases the rate of miscarriage, but suggested mechanisms are altered levels of endogenous hormones and disrupted placental blood flow. Caffeine also crosses the placenta, so it can have direct effects on the developing fetus. Women who regularly consume more than 300mg of caffeine a day might notice shorter-than-average menstrual cycles; however, there is no clear evidence on the effects of high caffeine intake on other aspects of reproductive function. A final point to bear in mind is that caffeine is not the only bioactive substance in coffee. It is possible that the different ingredients may have a cocktail or synergistic effect, and more work is required to examine circulating caffeine levels and to compare the effects of decaffeinated drinks with their caffeine-filled equivalents (Kate Dudek, May 5, 2020).

2.3.3 Stress/Anxiety

Psychological stress has been identified as a potential contributing factor to infertility, particularly among women exposed to demanding occupational or personal responsibilities. Symptoms of anxiety and depression are reported more frequently among infertile women than among their fertile counterparts. These psychological disturbances may adversely affect reproductive function by disrupting the physiological processes involved in oocyte maturation, thereby potentially reducing fertility (Sharkey and Zaidi, 2019). Infertility has profound social and psychological consequences, often causing considerable emotional distress among affected individuals and couples. Women experiencing infertility have been reported to have high prevalence of anxiety (23.2%) and depression (17.0%), reflecting the substantial mental health burden associated with the inability to conceive naturally. Delays in accessing specialized infertility care further exacerbate this burden, with approximately one-fifth of patients waiting two or more years before being referred to a fertility specialist. In addition, discontinuation of fertility treatment remains a significant challenge. Studies have shown that even among patients

with comprehensive health insurance coverage for fertility treatments, where financial constraints are minimized, treatment dropout rates remain remarkably high, ranging from 46.0% to 58.0%. These findings suggest that psychological, emotional, and treatment-related factors, in addition to financial barriers, play important roles in influencing treatment continuation and adherence (Angela Thable et al.,2020).

2.3.4 Nutrition Styles and Body Weight

Nutritional status and body weight play important roles in reproductive health and fertility. Both inadequate and excessive caloric and protein intake can adversely affect ovarian function, thereby increasing the risk of infertility. Extremes of body weight, including underweight, overweight, and obesity, are associated with disruptions in energy balance that may impair ovulation and contribute to ovulatory disorders. Studies have shown that women with a body mass index (BMI) below 19 kg/m^2 or above 25 kg/m^2 generally experience a longer time to conception compared with women with a normal BMI. Furthermore, overweight and obesity are associated with lower pregnancy rates, an increased requirement for gonadotropin stimulation during fertility treatment, and a higher risk of adverse pregnancy outcomes, including gestational diabetes, hypertensive disorders of pregnancy, and preterm birth. In addition to body weight, dietary quality also influences female reproductive function. Diets characterized by an imbalance in macronutrients, such as excessive intake of carbohydrates or fats, or inadequate consumption of proteins, vitamins, and essential micronutrients, may negatively affect ovulation and overall fertility. Emerging evidence also suggests that nutritional factors play a critical role in oocyte maturation, embryo quality, and implantation, highlighting the importance of maintaining a balanced diet and healthy body weight for optimal reproductive outcomes (Sharkey and Zaidi, 2019).

2.3.5 Environmental Pollutants

Occupational and environmental exposure to hazardous chemicals has been recognized as an important risk factor for impaired reproductive health. According to the Occupational Safety and Health Administration (OSHA), prolonged exposure to chemical agents, including organic

solvents, heavy metals, aromatic amines, pesticides, and plant-derived toxins, is associated with reduced fertility and an increased risk of sporadic or recurrent miscarriage. In addition, exposure to environmental pollutants may induce DNA damage through the formation of DNA adducts and apurinic/apyrimidinic (AP) sites, resulting in genetic alterations in gametes and developing embryos. If these DNA lesions are not adequately repaired, they may lead to permanent genetic mutations, thereby adversely affecting fertility, embryonic development, and pregnancy outcomes (Sharkey and Zaidi, 2019).

2.3.6 Nutritional Status, Body Weight, and Reproductive Health

2.3.6.1 Malnutrition

Adequate nutrition is essential for maintaining normal reproductive function in both men and women. Nutritional imbalances, including undernutrition and overnutrition, have been associated with impaired fertility through their adverse effects on reproductive physiology. In many developing countries, malnutrition remains a major contributor to infertility, whereas in developed nations, excessive caloric intake, frequent consumption of energy-dense processed foods, unhealthy dietary patterns, and obesity have emerged as important risk factors for subfertility. In women, poor nutritional status can disrupt the physiological processes involved in oocyte development and maturation, thereby compromising reproductive potential. Insufficient dietary intake, restrictive eating patterns, and deficiencies of essential nutrients, including proteins, vitamins, and macro- and micronutrients, can negatively affect reproductive health. These nutritional deficiencies may lead to reduced body weight and physical fitness, delayed pubertal development, prolonged postpartum intervals before conception, decreased gonadotropin secretion, disturbances in normal ovarian cyclicity, and impaired ovulation, ultimately resulting in reduced fertility. Alterations in energy balance have been shown to directly influence ovarian function and ovulatory maturation, highlighting the importance of adequate nutritional status for female reproductive health.

Nutritional disorders are therefore closely associated with the pathophysiology of female infertility. Eating disorders such as anorexia nervosa and bulimia nervosa, which affect a considerable proportion of women of reproductive age, are well-established causes of hypothalamic amenorrhea, ovulatory dysfunction, infertility, and an increased risk of miscarriage. These observations underscore the critical role of balanced nutrition in preserving reproductive function and improving fertility outcomes (Sharkey and Zaidi, 2019).

2.3.6.2 Nutritional Related Diseases: Overweight, Obesity, and Anovulation

Obesity is a major public health concern and is highly prevalent among women of reproductive age. It is characterized by excessive accumulation of body fat that adversely affects overall health and reproductive function. According to the World Health Organization (WHO), individuals with a body mass index (BMI) of 25.0–29.9 kg/m² are classified as overweight, whereas a BMI of 30.0 kg/m² or higher is classified as obesity. Both overweight and obesity have been associated with impaired fertility through multiple endocrine and metabolic mechanisms. In obese women, excess adipose tissue promotes increased peripheral aromatization of androgens into estrogens, leading to alterations in gonadotropin secretion. Obesity is also commonly associated with insulin resistance and compensatory hyperinsulinemia, which contribute to hyperandrogenism. Furthermore, obesity is characterized by reduced concentrations of sex hormone-binding globulin (SHBG), growth hormone (GH), and insulin-like growth factor-binding proteins (IGFBPs), as well as elevated circulating leptin levels. These hormonal and metabolic disturbances disrupt the normal regulation of the hypothalamic–pituitary–gonadal (HPG) axis, resulting in impaired follicular development, ovulatory dysfunction, and reduced reproductive potential. Consequently, obesity is recognized as an important modifiable risk factor for female infertility and adverse reproductive outcomes (Dağ & Dilbaz, 2015).

Overweight and obesity are common metabolic disorders among women of reproductive age and are reported in approximately 20.0–25.0% of women seeking infertility treatment. Even in the absence of ovulatory disorders, excess body weight is associated with prolonged time to conception, reduced effectiveness of infertility treatments, and an increased risk of adverse

maternal and neonatal outcomes, including gestational diabetes mellitus, hypertensive disorders of pregnancy, cesarean delivery, fetal macrosomia, perinatal morbidity, and perinatal mortality .The adverse effects of obesity on female fertility are largely mediated through endocrine and metabolic disturbances. Insulin resistance (IR) and compensatory hyperinsulinemia, which are characteristic features of obesity, metabolic syndrome (MetS), and polycystic ovary syndrome (PCOS), play central roles in impairing reproductive function. Elevated circulating insulin levels stimulate excessive androgen production by ovarian theca cells while disrupting lipid metabolism, thereby promoting hyperandrogenism, central adiposity, and dyslipidemia. These metabolic abnormalities reinforce one another, creating a self-perpetuating cycle of insulin resistance, abdominal obesity, and hormonal imbalance that further compromises fertility. In addition to metabolic alterations, obesity influences ovarian function through changes in the local cytokine and growth factor milieu. Cytokines and growth factors regulate essential reproductive processes, including follicular recruitment, growth, differentiation, atresia, oocyte maturation, and corpus luteum development. Members of the transforming growth factor-beta (TGF-β) superfamily participate throughout folliculogenesis, whereas other regulatory molecules, such as fibroblast growth factor-2 (FGF-2), vascular endothelial growth factor (VEGF), stromal cell-derived factor-1α (SDF-1α), and leptin, exert stage-specific effects on follicular development and luteal function. Leptin, in particular, modulates ovarian steroidogenesis by promoting estrogen synthesis in luteinized granulosa cells while suppressing progesterone production in insulin-stimulated theca cells. Collectively, these endocrine, metabolic, and inflammatory alterations contribute to impaired ovulation, reduced fertility, and poorer reproductive outcomes in women with obesity. This mechanism also explains obesity-related infertility, an altered metabolic state characterized by particularly high leptin concentrations (Sharkey and Zaidi, 2019).

Overweight and obesity are strongly associated with impaired female reproductive function. Women with excess body weight have a higher prevalence of menstrual irregularities, ovulatory dysfunction, and anovulation, all of which contribute to reduced fertility. In addition, overweight and obese women are at increased risk of subfertility, infertility, lower conception rates, higher rates of miscarriage, and various pregnancy-related complications. These adverse reproductive

effects are observed in both natural conception and assisted reproductive technologies (ART), including ovulation induction, in vitro fertilization/intracytoplasmic sperm injection (IVF/ICSI), and oocyte donation cycles. Importantly, weight reduction has been shown to improve menstrual regularity, restore ovulatory function, enhance fertility, and increase the likelihood of successful pregnancy outcomes in both spontaneous and assisted conception (Dağ & Dilbaz, 2015).

2.3.7 Polycystic Ovary Syndrome (PCOS)

Polycystic ovary syndrome (PCOS) is one of the most common endocrine disorders affecting women of reproductive age, with a global prevalence of up to 20.0%. It is a heterogeneous condition characterized by reproductive, metabolic, and endocrine abnormalities. According to the widely accepted diagnostic criteria, PCOs is diagnosed when at least two of the following features are present after excluding other etiologies: oligo- or anovulation, clinical or biochemical hyperandrogenism, and polycystic ovarian morphology on ultrasonography, defined as multiple small follicles and/or increased ovarian volume. Insulin resistance (IR) and compensatory hyperinsulinemia are central features in the pathophysiology of PCOs and are closely associated with the development of metabolic syndrome (MetS). Hyperinsulinemia contributes to ovarian dysfunction by enhancing androgen synthesis in ovarian theca cells and increasing ovarian sensitivity to luteinizing hormone (LH), thereby exacerbating hyperandrogenism. Although the precise mechanisms linking insulin resistance with ovulatory dysfunction remain incompletely understood, evidence suggests that insulin directly influences ovarian steroidogenesis and follicular development. The insulin-like growth factor (IGF) signaling pathway also plays an important role in the endocrine abnormalities observed in PCOs. Activation of the insulin-like growth factor I receptor (IGF-IR) by elevated insulin levels amplifies IGF-mediated intracellular signaling, thereby promoting androgen production in the ovaries. Furthermore, reduced hepatic synthesis of insulin-like growth factor-binding protein-1 (IGFBP-1) increases the bioavailability of IGF-I, further stimulating androgen secretion by ovarian theca and stromal cells. These hormonal disturbances impair normal follicular maturation and ovulation, contributing to the reproductive manifestations of PCOs.

PCOs is recognized as the leading cause of anovulatory infertility worldwide. Chronic anovulation, together with hyperandrogenism and metabolic dysfunction, significantly reduces fecundity and may adversely affect both spontaneous conception and the outcomes of assisted reproductive technologies. Early diagnosis and appropriate management of PCOs are therefore essential for improving fertility and long-term reproductive health. PCOs is the major cause of infertility due to anovulatory disorders, although the anovulation mechanisms are unclear. Anovulation is characterized by an apparent arrest of antral follicle development at the 5–10 mm stage, thus implying a failure to enter the pre-ovulatory phase of the cycle. Under specific conditions, however, spontaneous ovulation may occasionally occur, and the disorder can be reversed in most cases by increasing serum FSH levels.

Polycystic ovary syndrome (PCOs) is commonly associated with endocrine abnormalities, including altered gonadotropin secretion, reduced levels of insulin-like growth factor-binding protein-1 (IGFBP-1), elevated ovarian 17-hydroxyprogesterone (17-OHP) concentrations, and an exaggerated androgen response to gonadotropin-releasing hormone (GnRH) agonists. These hormonal disturbances contribute to impaired follicular development and chronic anovulation. PCOS accounts for approximately 75% of cases of anovulatory infertility, making it one of the leading causes of female infertility. The management of PCOS should be individualized according to the patient's clinical presentation and reproductive goals. For women seeking pregnancy, appropriate therapeutic interventions aimed at restoring ovulation are essential to improve fertility and reproductive outcomes.

Metformin is the most widely prescribed insulin-sensitizing agent for the management of polycystic ovary syndrome (PCOs). Its therapeutic effects are primarily mediated through improved insulin sensitivity, suppression of hepatic gluconeogenesis, reduced hepatic utilization of lactate and alanine, and enhanced conversion of pyruvate to alanine. Although the precise molecular mechanisms underlying its action have not been fully elucidated, several pathways have been proposed. These include inhibition of mitochondrial respiratory chain complex I and

mitochondrial glycerophosphate dehydrogenase, activation of adenosine monophosphate-activated protein kinase (AMPK), modulation of cyclic adenosine monophosphate (cAMP) signaling, suppression of glucagon-mediated hepatic glucose production, and alterations in the composition and function of the gut microbiota. Collectively, these mechanisms improve insulin homeostasis, promote normal follicular development and oocyte maturation, and enhance fertility outcomes in women with PCOs. Lifestyle and dietary modifications also play a crucial role in the management of PCOs. Diets with reduced carbohydrate content may improve insulin sensitivity by lowering postprandial glucose levels and reducing pancreatic β-cell stimulation, thereby reducing insulin secretion. In addition to facilitating weight management, dietary interventions may exert direct beneficial effects on β-cell function and insulin responsiveness, even in the absence of significant weight loss. Consequently, combining pharmacological therapy with appropriate nutritional interventions may provide greater improvements in metabolic health, ovulatory function, and reproductive outcomes among women with PCOs (Sharkey and Zaidi, 2019).

2.3.8 Metabolic Syndrome (MetS)

Metabolic syndrome (MetS) is a common metabolic disorder characterized by a cluster of interrelated risk factors, including central obesity, insulin resistance (IR), dyslipidemia, hypertension, and abnormalities in glucose metabolism. It represents a major public health challenge, particularly in developed countries, with an estimated prevalence of approximately 20.0% in the United States and up to 30.0% in Europe. The development of MetS is multifactorial and is strongly associated with excessive caloric intake, unhealthy dietary habits, physical inactivity, advancing age, and elevated body mass index (BMI). In addition to increasing the risk of cardiovascular disease and type 2 diabetes mellitus, MetS has also been implicated in the development of several malignancies, particularly cancers of the gastrointestinal tract.

Metabolic syndrome adversely affects female reproductive health through complex endocrine and metabolic mechanisms. Women with MetS, poor metabolic control, and primary or secondary amenorrhea have been reported to exhibit reduced circulating levels of luteinizing

hormone (LH) and follicle-stimulating hormone (FSH), often accompanied by impaired endogenous insulin secretion. Disturbances in the hypothalamic–pituitary–gonadal (HPG) axis, including alterations in gonadotropin-releasing hormone (GnRH) pulsatility and reduced frequency and amplitude of LH secretion, have also been observed in women with diabetes-related amenorrhea. Furthermore, insulin resistance, hyperinsulinemia, and other metabolic abnormalities associated with MetS may contribute to the development and progression of polycystic ovary syndrome (PCOs) by promoting hyperandrogenism, disrupting normal follicular maturation, and impairing ovulation. Consequently, MetS is recognized as an important contributor to female infertility and adverse reproductive outcomes (Sharkey and Zaidi, 2019).

2.4 Perceptions of Infertility

The experiences and consequences of infertility vary considerably between developed and developing societies because of differences in cultural values, social expectations, and healthcare systems. In developed countries, infertility is generally regarded as a medical and psychological condition, with comparatively less emphasis placed on its social implications. In contrast, infertility in many developing countries is deeply embedded within cultural and social contexts, where parenthood is considered a fundamental expectation of marriage and an important determinant of social identity and family status. In many high-income countries, remaining childfree may be viewed as a personal lifestyle choice. However, voluntary childlessness is uncommon in many low- and middle-income settings, where women are expected to bear children soon after marriage. Consequently, infertility is often highly visible and carries substantial social stigma. In these settings, motherhood is closely linked to a woman's social acceptance, marital stability, and economic security. In many cultures, bearing children enhances a woman's status within her family and community, strengthens inheritance rights, and ensures the continuation of family lineage. Similar pronatalist beliefs have also been reported among certain African, Hispanic, Arab American, and other ethnic communities, where childbearing is regarded as an important social and cultural obligation.

The social consequences of infertility can be severe, particularly for women. Childless women frequently experience stigma, discrimination, marital conflict, domestic violence, emotional abuse, and social exclusion, irrespective of whether the infertility is attributable to male or female factors. In some settings, women may face abandonment or pressure for their husbands to remarry despite the presence of male-factor infertility. For example, studies from Bangladesh have reported that remarriage is sometimes viewed as a solution to infertility, while women are often held solely responsible for the inability to conceive. Traditional beliefs and misconceptions regarding infertility further contribute to delayed diagnosis and treatment. In some cultures, infertility is attributed to supernatural or non-scientific causes, whereas in others, male infertility is denied because it is perceived as a threat to masculinity. Such misconceptions discourage appropriate medical evaluation of both partners and may delay timely access to infertility care. Addressing these sociocultural barriers through public education, community awareness, and gender-sensitive reproductive health services is essential for reducing stigma and improving access to appropriate infertility diagnosis and treatment (Dayal, 2013).

2.5 Prevalence of Infertility

Estimates of disease prevalence are used to assess disease burden, estimate the need for healthcare services, compare disease incidence across societies, and test disease trends. In such estimates, the prevalence rate of infertility as a health problem is no exception (Marzieh Rostami et al., 2014). Infertility affects both men and women. Yet women, particularly in developing countries, may bear the sole blame for barren marriages. In many areas, infertility is a socially acceptable basis for divorce by the husband. Infertility is a major global public health concern, affecting millions of couples worldwide. It is estimated that approximately 8.0–12.0% of couples globally experience infertility, although the prevalence may reach one-third of couples in certain regions. According to the World Health Organization (WHO), more than 180 million couples in developing countries are affected by either primary or secondary infertility, while other global

estimates suggest that over 186 million individuals experience infertility. In the United States, data from the Centers for Disease Control and Prevention (CDC) indicate that approximately 1.5 million women, representing about 6.0% of women of reproductive age, are affected by infertility. Furthermore, nearly one-quarter of infertile couples have multiple contributing factors, highlighting the multifactorial nature of the condition. Despite its widespread occurrence, substantial disparities exist between developed and developing countries in terms of access to infertility services, healthcare infrastructure, sociocultural attitudes, and the social implications of childlessness, all of which influence the burden and management of infertility.

The true prevalence of infertility in Bangladesh remains uncertain because of the limited availability of nationally representative data. However, findings from the World Fertility Survey estimated an infertility prevalence of approximately 4.0% among Bangladeshi couples, while the proportion of women who remain childless by the end of their reproductive years (45–49 years of age) has been reported to be as high as 15.0%. Historically, infertility has been perceived predominantly as a female health problem. Current evidence, however, indicates that infertility is a condition affecting both partners, with male factors accounting for approximately 40.0% of cases, female factors for another 40.0%, and the remaining cases resulting from combined or unexplained causes.

Despite its considerable health, social, and psychological consequences, infertility has received relatively limited attention in terms of healthcare resources, research, and policy development in many low- and middle-income countries, including Bangladesh. Furthermore, the underlying cause remains unidentified in a substantial proportion of infertile couples, highlighting the need for continued research into its etiology and pathophysiology. Advances in reproductive medicine, molecular genetics, next-generation sequencing, bioinformatics, and multidisciplinary collaborative research have substantially improved the understanding and diagnosis of infertility. Nevertheless, Bangladesh continues to face significant challenges in providing comprehensive infertility services and conducting high-quality research in reproductive health. Strengthening national research capacity and expanding access to infertility diagnosis and treatment are

essential for generating context-specific evidence, informing public health policies, and improving the quality and accessibility of infertility care in Bangladesh.

2.6 Rate of Infertility

According to the World Health Organization (WHO), infertility is defined as the inability to achieve pregnancy after 12 months or more of regular, unprotected sexual intercourse and is recognized as a major global public health concern. It is estimated that approximately one in four couples in developing countries experiences infertility during their reproductive years. Globally, the prevalence of infertility is reported to range from approximately 13.0% to 14.0%, although estimates vary across countries and populations. In Bangladesh, infertility remains a relatively neglected reproductive health issue, largely because national reproductive health policies have historically prioritized fertility reduction and population control. The country's family planning program has achieved remarkable success in reducing fertility rates; however, infertility has received comparatively limited attention in healthcare planning, research, and resource allocation. Consequently, nationally representative epidemiological data on infertility are still lacking. Available evidence suggests that the prevalence of infertility in Bangladesh varies across studies. A WHO survey conducted in 1976 estimated an infertility prevalence of approximately 6.0%. Subsequently, a study published in 1996 reported prevalence rates of 3.9% for primary infertility and 3.2% for secondary infertility. Findings from the World Fertility Survey and other regional studies estimated an overall infertility prevalence of approximately 4.0% among Bangladeshi couples. However, the proportion of women who remain childless by the end of their reproductive years (45–49 years) has been estimated at around 15.0%, one of the highest reported figures among South Asian countries. These findings underscore the need for comprehensive national epidemiological studies to accurately determine the burden of infertility and to guide evidence-based reproductive health policies and service delivery in Bangladesh (Salauddin GM et al., 2018).

2.7 Risk Factors of Infertility

According to the Collins English Dictionary, a risk factor is a factor, such as a habit or an environmental condition, which predisposes an individual to develop a particular disease (Collins English Dictionary 2019). A comprehensive infertility evaluation is recommended for women

aged 35 years and older who have failed to conceive after 6 months of regular, unprotected vaginal intercourse. For women younger than 35 years, infertility assessment is generally indicated after 12 months of unsuccessful attempts to achieve pregnancy under the same conditions. However, earlier evaluation may be appropriate for younger women who present with known risk factors that may impair fertility. These risk factors include a history of unilateral oophorectomy, known or suspected uterine, tubal, or peritoneal pathology, advanced (stage III–IV) endometriosis, or recurrent pregnancy loss, defined as two or more consecutive miscarriages. Early identification and assessment of these conditions facilitate timely diagnosis and appropriate management, thereby improving reproductive outcomes (Angela Thable et al, 2020). Some factors can easily affect whether a woman ovulates, gets pregnant, or delivers a child. These include:

- Age. Women in their late 30s and older are generally less fertile than women in their early 20s.
- Endometriosis
- Chronic diseases such as diabetes, lupus, arthritis, hypertension, and asthma
- Hormone imbalance
- Environmental factors. These include cigarette smoking, drinking alcohol, and exposure to workplace hazards or toxins.
- Too much body fat or very low body fat
- Abnormal Pap smears that have been treated with cryosurgery or cone biopsy
- DES taken by mother during pregnancy
- Sexually transmitted diseases
- Fallopian tube disease
- Multiple miscarriages
- Fibroids
- Pelvic surgery
- Abnormalities in the uterus that are present at birth or happen later in life (Health Encyclopedia 2019)

The evaluation of infertility should involve both partners, as male and female factors frequently coexist. Whenever possible, couples should be assessed together to facilitate a comprehensive evaluation and management plan. A detailed reproductive and menstrual history is a fundamental component of the assessment of female infertility. Information should include the age at menarche, menstrual cycle length and regularity, duration and volume of menstrual bleeding, and any recent changes in menstrual patterns. Early menarche has been associated with an increased risk of endometriosis, a common cause of infertility.

Assessment of ovulatory function is also essential. The presence or absence of ovulatory symptoms (molimina), such as cyclic breast tenderness, abdominal bloating, food cravings, fatigue, and fluid retention, may help distinguish ovulatory from anovulatory cycles. Menstrual irregularities, including oligomenorrhea and amenorrhea, often indicate ovulatory dysfunction and are commonly observed in women with polycystic ovary syndrome (PCOS). A comprehensive gynecological history should include the presence of pelvic pain, particularly if it is chronic, cyclic, progressive, or persistent, as these features may suggest endometriosis. Associated symptoms such as dyspareunia, dyschezia, dysuria, and menorrhagia should also be investigated because they may indicate underlying pelvic pathology. Both partners should be screened for a history of sexually transmitted infections, particularly Chlamydia trachomatis and Neisseria gonorrhoeae, as these infections are important preventable causes of pelvic inflammatory disease (PID), tubal damage, and infertility. The evaluation should also assess the presence of uterine abnormalities, including leiomyomas (uterine fibroids), which are the most common benign tumors of the female reproductive tract. Depending on their size and location, leiomyomas may contribute to infertility and are frequently associated with menorrhagia, iron-deficiency anemia, pelvic pain, and pressure symptoms. Furthermore, a detailed surgical history should be obtained, including previous abdominal or pelvic procedures such as dilation and curettage, surgery for ectopic pregnancy, tubal surgery, or other gynecological operations that may predispose to pelvic adhesions or tubal damage. A history of cervical procedures, including loop electrosurgical excision procedure (LEEP), cervical conization, cryotherapy, or laser ablation performed for cervical intraepithelial lesions, should also be documented, as these interventions may have implications for future reproductive outcomes. Surgical procedures involving or adjacent to the

reproductive tract may result in the formation of postoperative adhesions and scar tissue, which can compromise reproductive function and reduce future fertility. In addition, women with certain autoimmune disorders are at an increased risk of infertility, although this association is not solely attributable to the direct effects of autoantibodies on fertilization or embryo implantation. The diagnosis of infertility is also associated with considerable psychological distress. Couples experiencing infertility frequently report elevated levels of anxiety, depression, sexual dissatisfaction, and marital conflict, with psychological disorders among women potentially exerting further adverse effects on reproductive outcomes.

Preconception care is an essential component of fertility management and should include comprehensive counseling on optimizing reproductive health before conception. Women planning pregnancy are advised to take prenatal vitamin supplements containing folic acid to reduce the risk of neural tube defects and support healthy fetal development. Furthermore, both partners should be encouraged to adopt healthy lifestyle practices, including maintaining a balanced diet, engaging in regular physical activity, achieving a healthy body weight, avoiding tobacco, alcohol, and other harmful substances, and minimizing exposure to environmental and occupational toxins that may adversely affect fertility and fetal development (Angela Thable et al., 2020).

2.8 Infertility scenario worldwide

Reproductive health is influenced by a complex interplay of environmental, cultural, religious, political, and socioeconomic factors. Consequently, the causes and distribution of infertility vary across countries, populations, and even among different communities within the same region. Although the etiology of infertility is multifactorial, a substantial proportion of cases are attributable to preventable conditions. These include sexually transmitted infections (STIs), reproductive tract infections, parasitic diseases, and iatrogenic complications arising from medical or surgical interventions. In addition, exposure to environmental or dietary toxicants, as well as complications related to pregnancy, childbirth, the postpartum period, or unsafe abortion, may adversely affect reproductive function and contribute to infertility. Therefore, strengthening preventive healthcare services, promoting reproductive health education, ensuring access to safe

obstetric and abortion care, and implementing effective infection prevention strategies are essential for reducing the burden of preventable infertility.

Infertility is a worldwide problem affecting 8.1% of couples (50-80 million) during their reproductive lives (WHO, 1991). The prevalence of infertility varies considerably across developing regions, reflecting differences in socioeconomic conditions, reproductive health services, and the burden of reproductive tract infections. In sub-Saharan Africa, infertility prevalence among women aged 20–44 years has been reported to range from less than 10.0% in countries such as Togo and Rwanda to approximately 25.0% in Cameroon and the Central African Republic. Tubal factor infertility resulting from untreated sexually transmitted infections, particularly Neisseria gonorrhoeae, is considered one of the leading causes of infertility in this region. The high burden of infertility has also been linked to behavioral and social factors, including high rates of sexual partner change, premarital and extramarital sexual relationships, divorce, and commercial sex work, which increase the risk of sexually transmitted infections and subsequent reproductive tract damage.

Data from the Demographic and Health Surveys (1994–2000) further demonstrate regional variation in infertility within Africa. Among currently married women aged 25–49 years, the proportion who had never experienced a fertile pregnancy was estimated at 3.3% in Mozambique and 1.3% in Kenya. Among sexually active women, the proportion who had not achieved pregnancy was reported to be 4.6% and 2.5%, respectively. In South Asia, infertility prevalence is comparatively lower but remains a significant public health concern. In India, estimates from the 1981 Census suggested an infertility prevalence of approximately 4.0–6.0%, while the National Family Health Survey (NFHS-1) reported childlessness among approximately 2.4% of currently married women aged over 40 years. Other studies have estimated overall childlessness in India to range from approximately 2.5% to 5.5%, depending on the age group studied. Despite its substantial reproductive, psychological, and social consequences, infertility has historically received limited attention in both healthcare policy and social science research across South Asia and many other low- and middle-income countries. This relative neglect underscores the need for greater investment in epidemiological research, improved infertility services, and evidence-based reproductive health policies to address the growing burden of infertility in these settings.

Childlessness has profound demographic, social, psychological, and health-related consequences that extend far beyond the biological inability to conceive. The experience of infertility is shaped not only by reproductive impairment but also by cultural, social, interpersonal, and religious expectations surrounding parenthood. In many societies, the inability to have children is associated with feelings of grief, inadequacy, social isolation, and loss of identity. Individuals and couples affected by infertility often experience emotional distress as they struggle to meet societal expectations regarding family formation and parenthood. Infertility may also place considerable strain on marital and family relationships. Couples may experience conflict, mutual blame, diminished marital satisfaction, and emotional stress, particularly in cultures where childbearing is regarded as a primary purpose of marriage. Women are especially vulnerable to stigma and discrimination, as infertility is frequently perceived as a female problem regardless of its underlying cause. Consequently, childless women may experience social exclusion, reduced social status, and limited participation in important family and community events.

In many cultures, children play a central role in maintaining family continuity, providing emotional and economic support to parents, and caring for them in old age. Even in countries with well-established social welfare systems, adult children are often expected to assume caregiving responsibilities for aging parents. As a result, involuntary childlessness may create concerns regarding future social and financial security in addition to its emotional burden. Motherhood and childbearing are widely regarded as important milestones in a woman's life and are closely associated with perceptions of femininity, personal fulfillment, family cohesion, and social acceptance. For women who are unable to conceive, the inability to achieve these culturally valued roles may lead to feelings of incompleteness, low self-esteem, and psychological distress. Therefore, infertility should be recognized not only as a medical condition but also as a significant psychosocial issue that requires comprehensive, patient-centered care, including emotional support, counseling, and appropriate social interventions. Infertility is a significant global public health concern, affecting millions of couples worldwide. According to estimates from the World Health Organization (WHO), approximately 8.0–10.0% of couples

experience infertility, although the prevalence varies considerably across geographic regions and populations. In the United States, infertility affects an estimated five million individuals, while the prevalence in Europe is approximately 14.0%. Marked regional differences have also been reported, with infertility rates ranging from about 12.0% in several Western European countries to as high as 50.0% in certain communities in West Africa. Overall, the prevalence of infertility has been estimated to range from 3.5% to 16.7% in developed countries and from 6.9% to 9.3% in developing countries. These variations reflect differences in demographic characteristics, healthcare access, environmental exposures, and the underlying causes of infertility. In high-income countries, delayed childbearing and advanced maternal age are among the leading contributors to infertility, whereas reproductive tract infections and sexually transmitted infections remain major causes in many African countries.

The burden of infertility is particularly high in low- and middle-income countries. The WHO Demographic and Health Surveys (DHS) Comparative Report estimated that more than 186 million ever-married women in developing countries, excluding China, experience primary or secondary infertility, representing more than one-quarter of ever-married women of reproductive age. Despite this substantial burden, access to infertility diagnosis and treatment remains limited in many resource-constrained settings. Beyond its medical consequences, infertility has profound psychological and social implications. In many societies, parenthood is closely linked to personal identity, social acceptance, marital stability, and cultural or religious expectations. Consequently, infertility is often associated with emotional distress, feelings of inadequacy, social stigma, and marital conflict. Women are disproportionately affected by these societal pressures and are frequently held responsible for childlessness regardless of the underlying cause. In several low- and middle-income countries, infertility may result in discrimination, domestic violence, abandonment, social exclusion, or dissolution of marriage. For example, studies from South Asia have documented high levels of stigma and gender-based violence among women experiencing infertility. Similar findings have been reported in Pakistan, where infertility, particularly the inability to bear children or male offspring, has been associated with marital conflict and reduced social status.

Limited public awareness and widespread misconceptions further compound the burden of infertility. International surveys have consistently demonstrated poor knowledge regarding fertility, reproductive biology, and the appropriate timing for seeking infertility care. Many individuals remain unaware of the female fertile window or the age-related decline in fertility, leading to delayed diagnosis and treatment. In some cultural settings, infertility continues to be attributed to supernatural or spiritual causes, resulting in reliance on ineffective or potentially harmful traditional practices instead of evidence-based medical care. These misconceptions emphasize the importance of improving reproductive health education, increasing public awareness, and expanding access to accurate infertility information and appropriate healthcare services (Ali et al., 2011).

The provision of infertility care in developing countries has been the subject of considerable debate, particularly regarding its affordability, accessibility, and feasibility within resource-constrained health systems. Indonesia has established a relatively advanced assisted reproductive technology (ART) infrastructure, with approximately 20 government-regulated fertility clinics offering comprehensive infertility evaluation and treatment, including in vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI) for married couples. Despite the availability of these services, their utilization remains disproportionately low compared with other countries in the region. For example, although Indonesia had an estimated population of approximately 237 million, only 2,627 IVF cycles were performed in 2010. In contrast, Singapore, with a population of about 5 million, recorded approximately 2,500 IVF cycles during the same period, while Vietnam reported around 6,000 IVF cycles, the highest number in Southeast Asia.

The low utilization of ART services in Indonesia cannot be attributed solely to inadequate healthcare capacity. Fertility clinics are concentrated primarily in major urban centers on the island of Java, resulting in unequal geographical access to infertility services. Moreover, considerable variation exists in clinic utilization, with some centers operating close to full capacity while others perform relatively few treatment cycles despite having substantial unused resources. This imbalance suggests that barriers other than service availability, such as treatment

costs, limited public awareness, cultural beliefs, geographical accessibility, and socioeconomic constraints, may significantly influence healthcare utilization.

Infertility remains a significant public health concern in Indonesia, with conservative estimates indicating that approximately 10.0–15.0% of individuals of reproductive age experience infertility. However, these estimates are largely derived from healthcare utilization data and are likely to underestimate the true burden because they exclude individuals who do not seek biomedical infertility care. Given that childbearing is highly valued in Indonesian society and parenthood is considered an integral component of family life, the number of couples affected by infertility is substantial. Based on the country's reproductive-age female population of approximately 39.8 million, even a conservative infertility prevalence of 10.0% suggests that nearly four million women may experience infertility. These findings highlight the need to improve equitable access to infertility services, enhance public awareness, and address financial, geographical, and sociocultural barriers that limit the utilization of assisted reproductive technologies in developing countries (Bennett et al.2014).

2.9 Primary Infertility Scenario in Bangladesh

Infertility remains a relatively neglected component of reproductive health policy in Bangladesh, where public health initiatives have traditionally focused on reducing fertility and controlling population growth. As a result, national reproductive health strategies have prioritized family planning, and Bangladesh has achieved notable success in implementing population control programs. In contrast, infertility has received comparatively limited attention in research, healthcare planning, and service delivery. Consequently, no nationally representative epidemiological study has yet been conducted to determine the true prevalence of infertility in the country. Available evidence suggests that infertility represents a significant but underrecognized public health problem in Bangladesh. Estimates derived from the World Fertility Survey and other regional studies indicate an infertility prevalence of approximately 4.0% among couples in South Asia. However, estimates based on women at the end of their reproductive years (45–49 years of age) suggest that approximately 15.0% of Bangladeshi women experience primary or secondary infertility, one of the highest reported rates in South Asia. These findings

highlight the need for comprehensive national surveillance and epidemiological research to accurately quantify the burden of infertility in Bangladesh.

Several established risk factors for infertility are highly prevalent in Bangladesh. Reproductive tract infections (RTIs), sexually transmitted infections (STIs), urinary tract infections (UTIs), postpartum infections, unhygienic delivery practices, and complications arising from unsafe abortion or obstetric procedures have all been associated with pelvic inflammatory disease, tubal damage, and subsequent infertility. Although nationally representative data on sexually transmitted infections remain limited, available evidence suggests that these infections continue to pose a significant public health challenge. Analyses of community-based studies have reported a substantial burden of STIs, with earlier estimates indicating that approximately 2.3 million people in Bangladesh were affected. In addition, studies have documented a high prevalence of herpes simplex virus type 2 (HSV-2) among high-risk populations. Reproductive tract infections are also common among Bangladeshi women, with reported prevalence rates exceeding 50.0% in both rural and urban settings. The widespread occurrence of these preventable reproductive health conditions underscores the importance of strengthening infection prevention, improving maternal and reproductive healthcare services, expanding access to early diagnosis and treatment, and integrating infertility prevention and management into national reproductive health programs (WHSEA, 2002b).

2.10 Social Impacts and Psychological Consequences of Infertility

Infertility and its treatment affect both members of a couple and may have profound psychological, emotional, and social consequences. A substantial body of evidence indicates that infertility is associated with significant emotional distress, although women generally experience a greater psychological burden than men. Compared with their male partners, women tend to perceive infertility-related stress more intensely, experience greater reductions in self-esteem, and report a higher prevalence of psychosomatic symptoms. They are also more likely to develop anxiety, depression, and other psychological disorders during the infertility journey.

The psychological response to infertility varies among individuals and is influenced by multiple interacting factors, including personality traits, coping strategies, social support, cultural expectations, and the duration and cause of infertility. From a mental health perspective, infertility is recognized as one of the most stressful life events, with adverse effects on individual well-being and marital relationships. Studies have demonstrated that infertile individuals commonly experience emotional reactions such as sadness, frustration, anger, guilt, hopelessness, and chronic stress. These emotional responses may also be accompanied by reduced sexual satisfaction, mood disturbances, impaired concentration, excessive worry, self-blame, fatigue, changes in appetite, and diminished overall quality of life. Furthermore, infertility often imposes substantial financial strain because of the high cost of diagnostic investigations and treatment, further exacerbating psychological distress.

Infertility may also negatively affect marital relationships. Couples frequently experience communication difficulties, relationship conflict, and decreased marital satisfaction while undergoing infertility evaluation and treatment. Studies conducted in South Asia have reported that a considerable proportion of women experiencing infertility also encounter marital problems and social discrimination. In many cultures, the social expectation of parenthood intensifies the emotional burden of infertility, particularly for women, who are often held responsible for childlessness regardless of the underlying cause. Social support plays a critical role in helping couples cope with infertility-related stress. According to Cohen and McKay's model of social support, effective coping is facilitated through several forms of support, including tangible or practical assistance, emotional support, opportunities for positive self-appraisal, and a sense of belonging through meaningful social relationships. However, many infertile couples choose to conceal their fertility problems because of fear of stigma or negative social judgment. This reluctance to disclose infertility often limits access to emotional and practical support from family, friends, and the wider community. In addition, couples may experience feelings of isolation as many of their peers begin raising families, while some are hesitant to participate in support groups because they perceive seeking psychological support as a sign of personal failure. Consequently, the spouse frequently becomes the primary source of emotional support

throughout the infertility experience. These findings highlight the importance of integrating psychological counseling, couple-based interventions, and social support services into comprehensive infertility care to improve emotional well-being and treatment outcomes (Amir et al., 1999).

Childlessness may result in significant social, economic, and psychological challenges for women across different cultural settings. These consequences are largely influenced by women's social status, culturally defined gender roles, and societal expectations regarding motherhood. Although infertility affects both partners within a couple, numerous studies have shown that women generally experience a greater emotional and social burden than men. The psychological impact of infertility on women can be understood through several interconnected dimensions, including the social construction of motherhood, emotional responses to infertility diagnosis and treatment, and gender-specific differences in coping with reproductive failure. In many societies, parenthood is considered a fundamental life goal, and women are often socialized to view motherhood as an essential component of their identity and social role. Consequently, the inability to conceive may undermine self-esteem, femininity, and personal identity, resulting in feelings of inadequacy, grief, and emotional distress.

Social expectations surrounding childbearing frequently intensify after marriage. In many cultures, pressure from spouses, family members, and the wider community to have children increases during the early years of marriage, often becoming particularly pronounced within the first few years. Parenthood is commonly regarded as a symbol of marital fulfillment, family continuity, and social acceptance. Therefore, infertility may negatively affect not only an individual's self-image but also the perceived stability and purpose of the marital relationship. In addition, societal attitudes toward childlessness often contribute to the stigmatization of couples who do not have children. Research has shown that voluntarily childless couples are sometimes stereotyped as being less committed to family life, overly career-focused, selfish, psychologically maladjusted, or emotionally immature. For couples experiencing involuntary childlessness, these misconceptions may further increase psychological distress, social isolation, and feelings of

exclusion. These findings underscore the importance of addressing the social stigma associated with infertility and providing comprehensive psychological and social support as part of infertility care. The psychological impact of infertility extends beyond the inability to conceive and is often intensified throughout the diagnostic and treatment process. Although advances in reproductive medicine have improved the availability of fertility treatments, a successful pregnancy cannot be guaranteed. Consequently, couples frequently experience repeated cycles of hope and disappointment during treatment. The onset of menstruation following an unsuccessful treatment cycle often represents a profound emotional setback, commonly resulting in feelings of failure, sadness, and depression. While hormonal medications used during assisted reproductive treatments may contribute to mood changes, psychological distress is also influenced by numerous emotional and social factors.

Infertility treatment is frequently associated with significant financial costs, physically invasive procedures, time commitments, and uncertainty regarding treatment outcomes. These challenges may increase emotional stress and contribute to anxiety, depression, marital tension, and reduce quality of life. Couples considering the use of donor sperm, donor oocytes, or gestational surrogacy may encounter additional psychological and ethical concerns, including issues related to confidentiality, disclosure to future offspring, family dynamics, cultural acceptance, and personal or religious beliefs. The prolonged waiting period between treatment and pregnancy testing further heightens emotional uncertainty, while unsuccessful treatment outcomes may intensify feelings of grief and hopelessness.

Receiving a diagnosis of infertility often evokes a profound sense of loss. Individuals may experience the loss of anticipated parenthood, diminished reproductive potential, altered self-esteem, threatened gender or sexual identity, reduced sense of personal control, and concerns regarding the future of their relationships. These perceived losses may also affect emotional intimacy with partners, family members, and friends. Common emotional responses include sadness, frustration, guilt, loneliness, fear, helplessness, shame, anger, reduced self-confidence, and emotional exhaustion. Many of these reactions resemble the psychological stages associated

with grief, including denial, anger, guilt, anxiety, sadness, and depression. Given the substantial emotional burden associated with infertility diagnosis and treatment, integrating psychological counseling and emotional support into infertility care is essential to improve the overall well-being and treatment experience of affected couples (Gibson et al., 2000).

Research on infertility has shown that couples' psychological adjustment is influenced by several personal, clinical, and social factors. Drawing on the transition framework proposed by Schlossberg et al. (1995), diagnostic status has been identified as an important determinant of emotional adaptation. Individuals and couples diagnosed with unexplained infertility often report greater psychological distress, higher levels of depression, and increased difficulty accepting involuntary childlessness compared with those whose infertility has an identifiable medical cause. The uncertainty associated with unexplained infertility frequently complicates the coping process and delays emotional adjustment. Parental status also plays a significant role in adaptation to infertility. The inability to conceive biologically and the inability to experience parenthood represent two related but distinct forms of loss. Couples who eventually become parents through adoption or other alternative pathways may experience some degree of emotional adjustment, whereas couples who remain permanently childless must cope simultaneously with the loss of biological parenthood and the absence of a parenting role. These multiple losses may place additional demands on their psychological coping resources.

Several individual characteristics have been associated with the emotional response to infertility, including gender, age, and perceived physical and psychological health. Numerous studies have consistently shown that women experience greater emotional distress than men, reflecting both biological concerns and the sociocultural expectations surrounding motherhood. Age is another important determinant of psychological well-being, particularly among women approaching the end of their reproductive years, as concerns regarding declining fertility and limited treatment opportunities often intensify stress, anxiety, and feelings of urgency.

The transactional model of stress and coping, proposed by Lazarus and Folkman, classifies coping strategies into two broad categories: problem-focused and emotion-focused coping. Problem-

focused coping involves active efforts to manage or modify the source of stress through behaviors such as seeking information, obtaining professional assistance, making informed decisions, and taking practical actions to address the problem. This approach is generally adopted when individuals believe that the situation is controllable and that their actions can positively influence the outcome. In contrast, emotion-focused coping is directed toward regulating the emotional consequences of stressful situations rather than altering the stressor itself. Common emotion-focused strategies include emotional acceptance, cognitive reframing, denial, avoidance, wishful thinking, and seeking emotional support. These strategies are more frequently employed when individuals perceive that the situation cannot be readily changed, such as during unsuccessful infertility treatment or when confronted with permanent childlessness. Although both coping approaches may be beneficial depending on the circumstances, effective psychological adaptation to infertility often requires a flexible combination of problem-focused and emotion-focused strategies supported by appropriate counseling, partner support, and psychosocial interventions (Daniluk et al, 2007).

2.11 Impacts of Infertility in Bangladesh

Although Bangladesh has historically adopted antinatalist policies to control population growth, the society itself remains strongly pronatalist. Within the Bangladeshi cultural context, children are highly valued for economic, social, cultural, and religious reasons, and parenthood is considered an essential component of marriage and family life. As a result, involuntary childlessness has far-reaching social, psychological, and economic consequences, particularly for women in both rural and urban settings. Evidence suggests that childless women in Bangladesh frequently experience social stigma, discrimination, domestic violence, marital instability, and financial insecurity. In the country's patriarchal social structure, motherhood is often regarded as a defining attribute of womanhood, and a woman's social status and identity are closely linked to her ability to bear children. Consequently, infertility and childlessness may undermine a woman's self-identity, reduce her social standing, and lead to marginalization within her family and the wider community. The cumulative effect of these experiences often results in considerable emotional suffering and diminished quality of life, highlighting the need to address infertility not only as a medical condition but also as a significant social and gender-related issue

(Nahar & Richters, 2011). Studies conducted in Bangladesh have demonstrated that childlessness has substantial psychosocial and economic consequences across different socioeconomic groups. Both illiterate women from rural, low-income communities and educated women from urban, middle-class backgrounds experience significant stigma, feelings of guilt, diminished self-esteem, perceived failure to fulfill socially expected gender roles, social isolation, and, in some cases, abandonment by family members. However, the severity and nature of these experiences vary according to socioeconomic status and place of residence. Urban women generally have greater access to education, healthcare, and social resources, which may help reduce some of the adverse consequences of childlessness. Nevertheless, many continue to experience considerable emotional distress and dissatisfaction due to persistent societal expectations regarding motherhood. Economic hardship is particularly pronounced among childless women living in rural and economically disadvantaged settings, where infertility may further increase financial insecurity and social vulnerability. In addition to its social and economic consequences, infertility has a significant impact on mental health. Studies in Bangladesh have consistently reported that infertile women exhibit poorer psychological well-being and lower mental health scores than fertile women, reflecting higher levels of anxiety, depression, emotional distress, and reduced quality of life. These findings highlight the importance of integrating psychological support and social interventions into infertility care, particularly for socioeconomically disadvantaged women (Salauddin et al., 2018).

2.12 Management of Infertility

Infertility services and treatment worldwide

The evaluation of infertility should follow a systematic, evidence-based approach to ensure timely diagnosis while minimizing unnecessary investigations, treatment delays, and healthcare costs. A comprehensive assessment should involve both partners and include detailed medical, reproductive, sexual, and lifestyle history, a thorough physical examination, and appropriate diagnostic investigations. Couples should be encouraged to receive care from a single specialized healthcare team whenever possible to avoid fragmented management, duplication of investigations, and delays in establishing an accurate diagnosis. Clinical decision-making should

be guided by current evidence-based recommendations to ensure appropriate and effective treatment. In many cases, a detailed clinical history combined with a basic semen analysis is sufficient to identify common causes of infertility, including male factor infertility, ovulatory disorders, and conditions suggestive of tubal pathology. In low-resource settings, healthcare providers should also consider endemic infectious diseases, such as tuberculosis, schistosomiasis, malaria, and human immunodeficiency virus (HIV) infection, as these conditions may directly or indirectly impair reproductive function. Furthermore, a history of sexually transmitted infections (STIs), reproductive tract infections (RTIs), unsafe abortion, postpartum infections, or delivery-related complications should be carefully evaluated because these conditions increase the risk of pelvic inflammatory disease and tubal infertility.

Assessment of tubal patency is an essential component of female infertility evaluation. Hysterosalpingography (HSG), together with an appropriate clinical history, provides a relatively sensitive, minimally invasive, and cost-effective method for diagnosing tubal abnormalities. Where indicated, diagnostic laparoscopy may be performed as a second-line investigation to confirm tubal disease, detect pelvic adhesions, or diagnose endometriosis. Simplified laparoscopic techniques have been shown to be feasible and effective, particularly in resource-limited settings. The implementation of standardized clinical guidelines, structured referral pathways, and adequate training of healthcare professionals can substantially improve the quality and consistency of infertility care. However, infertility services remain underdeveloped in many low- and middle-income countries because reproductive health programs often prioritize maternal health and family planning over infertility management. Consequently, deficiencies in healthcare infrastructure, limited laboratory facilities, inadequate referral systems, and fragmented preventive services continue to hinder timely diagnosis and treatment. Female fertility depends on several coordinated physiological processes, including the production and release of healthy oocytes, normal transport of the oocyte through patent fallopian tubes, successful fertilization by viable sperm, and implantation of the resulting embryo within a receptive endometrium. Accordingly, the evaluation of female infertility aims to identify abnormalities affecting ovulation, tubal patency, fertilization, or uterine receptivity so that

appropriate management strategies can be implemented. A physical exam is required, including a regular pelvic exam. Infertility tests may include:

- The evaluation of infertility should follow a systematic, evidence-based approach to ensure timely diagnosis while minimizing unnecessary investigations, treatment delays, and healthcare costs. A comprehensive assessment should involve both partners and include a detailed medical, reproductive, sexual, and lifestyle history, a thorough physical examination, and appropriate diagnostic investigations. Couples should be encouraged to receive care from a single specialized healthcare team whenever possible to avoid fragmented management, duplication of investigations, and delays in establishing an accurate diagnosis. Clinical decision-making should be guided by current evidence-based recommendations to ensure appropriate and effective treatment.

- In many cases, a detailed clinical history combined with a basic semen analysis is sufficient to identify common causes of infertility, including male factor infertility, ovulatory disorders, and conditions suggestive of tubal pathology. In low-resource settings, healthcare providers should also consider endemic infectious diseases, such as tuberculosis, schistosomiasis, malaria, and human immunodeficiency virus (HIV) infection, as these conditions may directly or indirectly impair reproductive function. Furthermore, a history of sexually transmitted infections (STIs), reproductive tract infections (RTIs), unsafe abortion, postpartum infections, or delivery-related complications should be carefully evaluated because these conditions increase the risk of pelvic inflammatory disease and tubal infertility.

- Assessment of tubal patency is an essential component of female infertility evaluation. Hysterosalpingography (HSG), together with an appropriate clinical history, provides a relatively sensitive, minimally invasive, and cost-effective method for diagnosing tubal abnormalities. Where indicated, diagnostic laparoscopy may be performed as a second-line investigation to confirm tubal disease, detect pelvic adhesions, or diagnose

endometriosis. Simplified laparoscopic techniques have been shown to be feasible and effective, particularly in resource-limited settings.

- The implementation of standardized clinical guidelines, structured referral pathways, and adequate training of healthcare professionals can substantially improve the quality and consistency of infertility care. However, infertility services remain underdeveloped in many low- and middle-income countries because reproductive health programs often prioritize maternal health and family planning over infertility management. Consequently, deficiencies in healthcare infrastructure, limited laboratory facilities, inadequate referral systems, and fragmented preventive services continue to hinder timely diagnosis and treatment.

- Female fertility depends on several coordinated physiological processes, including the production and release of healthy oocytes, normal transport of the oocyte through patent fallopian tubes, successful fertilization by viable sperm, and implantation of the resulting embryo within a receptive endometrium. Accordingly, the evaluation of female infertility aims to identify abnormalities affecting ovulation, tubal patency, fertilization, or uterine receptivity so that appropriate management strategies can be implemented (Mayo Clinic, n.d., 2026).

2.13 Treatment of Infertility

The treatment of infertility should be based on the best available scientific evidence. In low-resource settings, however, evidence-based recommendations must be carefully balanced with considerations of safety, simplicity, feasibility, and cost-effectiveness. Furthermore, improving awareness and understanding of basic fertility principles among both patients and healthcare providers in infertility clinics is an essential component of effective treatment programs and has been shown to enhance treatment outcomes. (Sharma et al., 2009).

Female infertility may be managed with medical therapy, surgical correction of reproductive tract abnormalities, or assisted reproductive techniques, depending on the underlying cause. The standard initial treatment for unexplained infertility often consists of one to three cycles of ovarian stimulation combined with intrauterine insemination (IUI). A comprehensive diagnostic evaluation is essential to identify potential causes of infertility and guide appropriate treatment. Laboratory investigations play a central role in assessing hormonal function and ovarian reserve. Initial hormonal evaluation should include measurement of follicle-stimulating hormone (FSH), luteinizing hormone (LH), and estradiol levels on days 2–4 of the menstrual cycle. Ovulation is commonly confirmed by measuring serum progesterone levels approximately seven days after ovulation, typically on day 21 in women with regular 28-day menstrual cycles. Women who monitor basal body temperature can have progesterone measured seven days after their identified ovulation day. Additional laboratory investigations, which may be performed at any stage of the menstrual cycle, include thyroid-stimulating hormone (TSH), prolactin, serological screening for hepatitis B, hepatitis C, HIV, and syphilis, assessment of rubella and varicella immunity, and testing for chlamydia and gonorrhea using urine or cervical swab specimens.

Further investigations should be individualized according to the patient's clinical history, risk factors, and physical examination findings. These may include a complete blood count, comprehensive metabolic panel, glycated hemoglobin (HbA1c), lipid profile, and measurement of anti-Müllerian hormone (AMH). AMH, secreted by preantral and small antral follicles, reflects the remaining ovarian follicle pool and is considered the most reliable biochemical marker of ovarian reserve due to its minimal cycle-to-cycle variability compared with FSH. Because AMH levels decline with advancing age, results should be interpreted using age-specific reference ranges. Abnormal hormonal findings warrant prompt referral to a fertility specialist for further evaluation and management. In women with suspected polycystic ovary syndrome (PCOS), serum androgen levels, particularly testosterone, should also be assessed. Pelvic ultrasonography is useful for identifying polycystic ovarian morphology and detecting structural abnormalities of the uterus and ovaries. However,

according to the Rotterdam criteria, ultrasonographic findings alone are not required for the diagnosis of PCOS and should be interpreted alongside clinical and biochemical features.

In women with ovulatory dysfunction and no other identifiable cause of infertility, such as normal semen parameters and patent fallopian tubes, ovulation induction is considered the first-line treatment. Clomiphene citrate is the most commonly used oral ovulation induction agent, achieving ovulation in approximately 70.0% of women. When combined with appropriately timed intercourse, it results in pregnancy rates of up to 25.0% per treatment cycle. This approach is relatively simple, safe, cost-effective, and can be implemented in low-resource settings. With appropriate training, nurses and other paramedical personnel can effectively administer and monitor this treatment.

In some low- and middle-income countries, including India, ovulation induction medications are often used empirically without adequate infertility evaluation or medical prescription, sometimes within a few months of marriage to improve fertility. However, such unsupervised use is not recommended, as it increases the risk of complications, including multiple pregnancy and ovarian hyperstimulation syndrome (OHSS), particularly when high doses are used or treatment cycles are not properly monitored (Sharma et al.2009).

2.13.1 Initial treatment:

Clomiphene- Clomiphene citrate is a well-established first-line oral ovulation induction agent widely used in the management of ovulatory disorders, particularly in women with polycystic ovary syndrome (PCOS). Although highly effective, ovulation induction therapy is associated with potential risks, including multiple pregnancy, ovarian hyperstimulation syndrome (OHSS), thromboembolic events, and a possible increased risk of ovarian cancer among women who remain nulliparous. Therefore, patients should be appropriately counseled regarding these potential complications before initiating treatment.

Women with PCOS who present with amenorrhea often require a course of synthetic progesterone, such as medroxyprogesterone acetate, to induce withdrawal bleeding before starting ovulation induction. Following treatment with progesterone and clomiphene citrate,

ovulation should be confirmed by measuring serum progesterone approximately seven days before the expected onset of menstruation (commonly on day 21 of a 28-day menstrual cycle). A serum progesterone level below 5 ng/mL suggests anovulation; in such cases, the dose of clomiphene citrate may be increased in subsequent treatment cycles under appropriate clinical supervision.

Letrozole- Recent evidence suggests that letrozole is more effective than clomiphene citrate for ovulation induction and is now considered the preferred first-line treatment for many women with ovulatory infertility, particularly those with polycystic ovary syndrome (PCOS). Both letrozole and clomiphene citrate can stimulate the development of multiple ovarian follicles, thereby increasing the risk of multiple gestation. To minimize this risk, treatment should be initiated at moderate doses, especially in primary care settings.

Ovulation induction may not be appropriate for women at increased risk of pregnancy-related complications, such as those with a history of pregnancy-induced preeclampsia, because multiple gestation can further increase maternal and fetal risks. In such cases, referral to a fertility specialist is recommended. When higher doses of ovulation induction agents are required, treatment should be accompanied by transvaginal ultrasound monitoring to assess follicular development and ensure that no more than two dominant follicles are present before proceeding. However, because ultrasound monitoring is often unavailable in primary care settings, women requiring higher-dose ovulation induction should be referred to specialized infertility services for appropriate monitoring and management.

Metformin- Metformin has traditionally been used in the management of women with polycystic ovary syndrome (PCOS) because it improves insulin sensitivity and may reduce circulating insulin, free testosterone, and luteinizing hormone (LH) levels while increasing sex hormone-binding globulin (SHBG). However, current evidence does not support the use of metformin as a first-line monotherapy for ovulation induction, except in women with coexisting type 2 diabetes mellitus or features of metabolic syndrome. When used in combination with ovulation induction agents, metformin has demonstrated only modest improvements in ovulation rates, with limited clinical

benefit. Furthermore, metformin is frequently associated with gastrointestinal adverse effects, including abdominal bloating, nausea, abdominal cramps, and diarrhea. To improve tolerability, treatment should be initiated at the lowest effective dose and gradually titrated upward as tolerated (Angela Thable et al., 2020).

Controlled ovarian stimulation can be achieved using several pharmacological agents. Due to its simplicity, safety profile, and cost-effectiveness, clomiphene citrate has traditionally been the first-line treatment for ovulatory infertility. If clomiphene therapy is unsuccessful, ovulation induction with gonadotropins, often combined with intrauterine insemination (IUI), is the next therapeutic option. Although IUI is an effective treatment, it requires specialized infrastructure, trained personnel, and close monitoring of ovarian response. Gonadotropin therapy carries an increased risk of ovarian hyperstimulation syndrome (OHSS) and multiple pregnancies, particularly when treatment is inadequately monitored. Ultrasound monitoring of follicular development is therefore essential, but it substantially increases treatment costs because of the need for specialized equipment, laboratory support, medications, and skilled healthcare providers. The management of treatment-related complications further adds to the financial burden on healthcare systems .For women with tubal factor infertility, reconstructive tubal surgery may be considered, with reported success rates of approximately 50.0%; however, outcomes depend on the extent of tubal damage, associated pelvic pathology, the surgical approach (open, microsurgical, or laparoscopic), and the surgeon's expertise. When surgery is unsuccessful or inappropriate, assisted reproductive technology (ART) becomes the preferred treatment option. ART encompasses procedures involving the in vitro handling of gametes or embryos, including intrauterine insemination (IUI), in vitro fertilization (IVF), and intracytoplasmic sperm injection (ICSI). IVF is generally regarded as the treatment of choice for tubal infertility, while ART is also indicated for unexplained infertility, male factor infertility, diminished ovarian reserve, premature ovarian insufficiency, and other selected infertility conditions.

Despite their effectiveness, assisted reproductive technologies require substantial investment in laboratory infrastructure, specialized equipment, trained personnel, medications, and quality

assurance systems, making these treatments inaccessible for many patients, particularly in low-resource settings. Although ART services have expanded in many developing countries, they remain largely confined to the private sector because of their high cost. To improve accessibility, simplified and lower-cost approaches, such as natural-cycle IVF and intravaginal culture systems, have been developed. However, further high-quality clinical research is needed to establish their effectiveness, safety, and cost-effectiveness before they can be widely recommended.

2.13.2 Treatment for infertility caused by Genital TB:

Female genital tuberculosis (FGTB) is treated with standard anti-tubercular therapy (ATT), consisting of an intensive phase of daily rifampicin (R), isoniazid (H), pyrazinamide (Z), and ethambutol (E) for two months, followed by a continuation phase of daily rifampicin and isoniazid for an additional four months. Alternatively, a thrice-weekly regimen of RHZE for two months followed by RH for four months may be administered under the Directly Observed Treatment, Short-course (DOTS) strategy. Surgical intervention is rarely required and is generally reserved for specific indications, such as drainage of persistent pelvic abscesses.

Following successful treatment of the infection, fertility outcomes depend largely on the extent of reproductive tract damage. Women with irreparable fallopian tube damage but a functional endometrium may achieve pregnancy through in vitro fertilization and embryo transfer (IVF-ET). However, when the endometrium has been severely damaged, resulting in an unsuitable uterine environment for implantation, gestational surrogacy or adoption may represent the most appropriate options for achieving parenthood (Sharma *et al*., 2016).

2.14 Assisted Reproductive Technologies in Infertility Treatment

It is estimated that up to 10.0% of couples undergoing infertility treatment will ultimately require some form of assisted reproductive technology (ART). Although the indications for ART are generally similar across both high- and low-resource settings, the greater prevalence of tubal factor infertility in low-resource countries is likely to increase the demand for in vitro fertilization (IVF). Advances in reproductive medicine have also expanded the indications and scope of ART

to include procedures such as oocyte and embryo donation, preimplantation genetic testing (PGT), and in vitro maturation (IVM) of oocytes.

IVF remains the treatment of choice for women with tubal factor infertility. However, establishing and maintaining advanced ART services in low-resource settings presents considerable financial and logistical challenges. These programs require substantial investment in specialized infrastructure, laboratory facilities, equipment, trained personnel, and ongoing quality assurance, resulting in high initial and recurring costs. In addition, ART imposes indirect costs on healthcare systems through the need for intensive monitoring and the management of treatment-related complications, including ovarian hyperstimulation syndrome (OHSS) and multiple pregnancies. Consequently, despite its proven effectiveness, access to ART remains limited in many low- and middle-income countries, highlighting the need for affordable and simplified reproductive technologies.

The high cost of assisted reproductive technologies (ARTs) remains a major barrier to their accessibility worldwide. Even in high-income countries such as the United States, financial constraints are a leading reason why many couples discontinue treatment after an initial in vitro fertilization (IVF) cycle. The challenge is even greater in low-resource settings, where healthcare expenditure is substantially lower than in developed countries. Establishing and operating an ART unit requires considerable financial investment, and in some settings, such as Nigeria, it has been estimated that an ART program may consume up to half of a healthcare facility's budget. Consequently, limited healthcare resources are often prioritized toward addressing more pressing public health concerns, including maternal mortality, communicable diseases, and population health programs. Despite these challenges, private fertility clinics have expanded rapidly in many low- and middle-income countries, improving the availability of ART services but also creating significant inequities in access. Because treatment costs are largely borne by patients, ART remains inaccessible for many couples from lower socioeconomic backgrounds. Although government subsidies could improve access, they may be difficult to implement in resource-constrained health systems where competing healthcare priorities exist. Since the introduction of ART services in India in the 1980s, the number of fertility clinics has increased substantially, a trend that has also been observed in countries such as Egypt and several nations

in Latin America. Nevertheless, in many developing countries, ART services remain either unavailable or financially inaccessible, and where services do exist, their quality and regulation may be inconsistent. These challenges underscore the urgent need to develop affordable, simplified, and high-quality assisted reproductive technologies that can improve equitable access to infertility care in low-resource settings. Over the past several decades, delayed childbearing has become increasingly common among women in developed countries, contributing to a growing prevalence of infertility. In the United States, an estimated 7.9 million women experienced fertility problems in 2002, representing a 44.0% increase among women aged 15–44 years compared with 1982 (Sharma et al., 2009). Concurrent advances in assisted reproductive technologies (ART) have expanded the range of treatment options, enabling many individuals and couples to achieve biological parenthood. However, these treatments remain costly, and historically only a limited proportion of health insurance plans in the United States have provided coverage for infertility care.

The high cost of infertility treatment has prompted legislative efforts at both federal and state levels to improve insurance coverage. Several U.S. states have enacted infertility insurance mandates requiring private insurers to cover some infertility services, while similar legislative initiatives continue to be considered elsewhere. Proponents argue that such mandates improve equitable access to infertility treatment by reducing financial barriers, particularly for couples who would otherwise be unable to afford care. In contrast, opponents contend that mandatory coverage may increase insurance premiums and require individuals to pay for benefits they may never use. Consequently, evaluating the impact of infertility insurance mandates on healthcare utilization, access to treatment, and health equity remains an important consideration for policymakers, particularly in the context of broader healthcare reform.

Understanding the potential impact of infertility insurance mandates requires an appreciation of the stepwise approach to infertility management. Although treatment pathways vary according to the underlying cause of infertility and individual patient characteristics, infertility care generally follows a hierarchical progression. The initial stage consists of a comprehensive diagnostic evaluation of both partners, including assessment of the reproductive organs and relevant endocrine, circulatory, and, when indicated, neurological functions to identify potential

causes of infertility. Treatment typically begins with first-line ovulation induction using clomiphene citrate for up to six treatment cycles. If pregnancy is not achieved, second-line therapy involves ovulation induction with exogenous gonadotropins, with or without intrauterine insemination (IUI), for up to six cycles. Couples who fail to conceive with these approaches or who have specific indications for advanced treatment may proceed to assisted reproductive technologies (ART), such as in vitro fertilization (IVF), which may require four or more treatment cycles. Consequently, most couples undergoing IVF have already received one or more cycles of less invasive therapies. Studies suggest that more than 80.0% of couples who complete the full sequence of infertility treatments ultimately achieve pregnancy. However, even when IVF is successful during the first treatment cycle, the overall diagnostic and therapeutic process often extends over two to three years (Sharma et. al.2009).

2.15 Pathways to Infertility Care in Bangladesh

The infrastructure for infertility management is illustrated in the following figures. These figures demonstrate that, in many low- and middle-income countries, government policies and donor-funded health programs have traditionally prioritized fertility control, family planning, and maternal health, while infertility prevention and treatment have received comparatively little attention. Consequently, infertility services are often underdeveloped and inadequately integrated into national reproductive health programs.

Estimating the true burden of infertility is further complicated by methodological challenges in epidemiological and demographic research. Standard demographic definitions of infertility may exclude certain groups of infertile individuals, leading to underestimation of its prevalence. Moreover, the traditional public health focus on reducing maternal mortality and controlling population growth has often framed women's reproductive health primarily in terms of pregnancy and childbirth, resulting in infertility being overlooked as an important reproductive health issue. In many settings where government and non-governmental health services provide limited infertility care, private healthcare providers—both formal and informal—have emerged

to meet the unmet demand for diagnosis and treatment. However, access to these services is frequently constrained by high costs, variable quality of care, and inadequate regulatory oversight.

Figure 2.1 shows the hierarchical Decision-Making for Infertility Care in the Public Health Sector

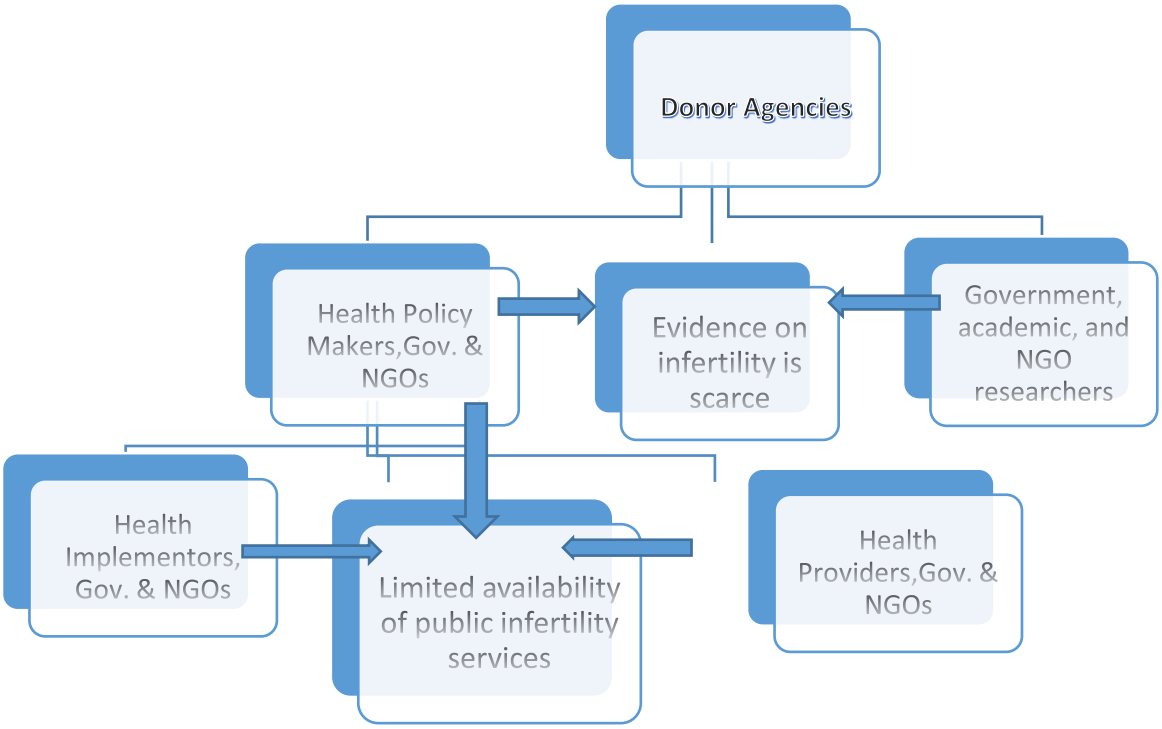


Figure 2.1:Hierarchical Decision-Making for Infertility Care in the Public Health Sector

Government and non-governmental organization (NGO) representatives have reported that infertility has not been incorporated into national reproductive health programs because it is not considered a priority within Bangladesh's public health agenda, and donor agencies have shown limited interest in funding infertility-related services. NGO representatives further indicated that the provision of infertility care requires specialized training for physicians, laboratory personnel, and other healthcare professionals, resources that are often unavailable within their organizations. As program implementers, NGOs have limited influence over national health

policies and priorities, which are largely determined by government policymakers and funding agencies.

As a result of the limited availability of infertility services in the public sector, private biomedical practitioners have become the principal providers of infertility diagnosis and treatment within the formal healthcare system in Bangladesh. However, access to these services is often constrained by high treatment costs and unequal geographical distribution, limiting their availability to many couples. The following figure illustrates the availability and distribution of infertility services within the private healthcare sector in Bangladesh (Figure 2.2).

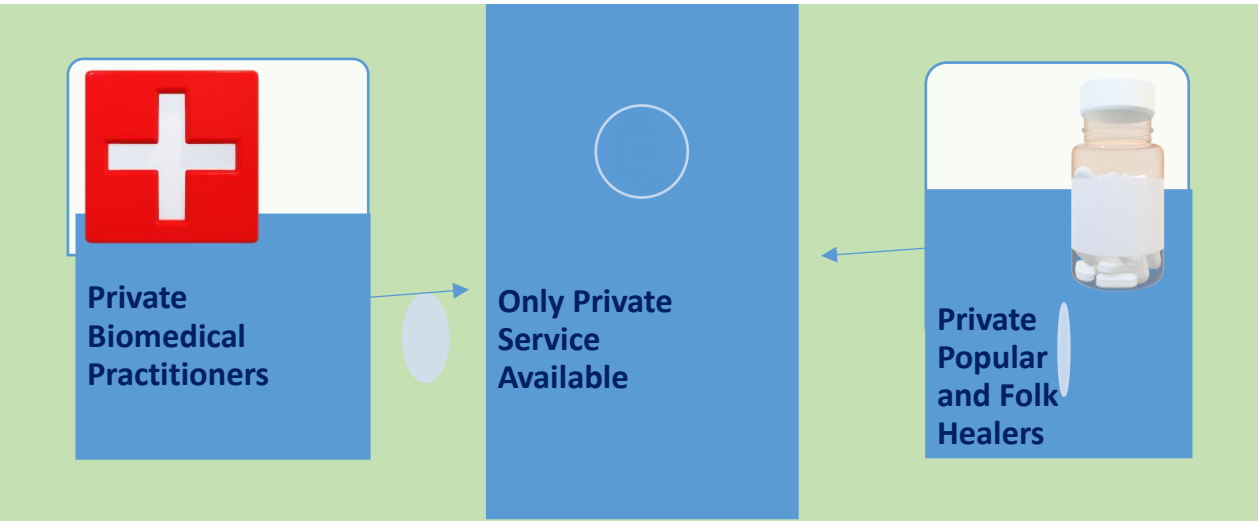


Figure 2.2: Availability and Accessibility of Infertility Services in Bangladesh's Private Sector

For many people living in rural Bangladesh, infertility treatment within the formal private healthcare sector is often financially unaffordable and geographically inaccessible. Consequently, many couples seek care from informal healthcare providers, who commonly offer treatments based on herbal remedies, amulets, holy water blessed with Quranic or other religious verses, traditional medicines, and various spiritual or religious rituals. Traditional healers reported that they did not specialize exclusively in infertility treatment; rather, they acquired knowledge of infertility management alongside the treatment of other illnesses through apprenticeship with their gurus and therefore provide infertility care as part of their broader practice.

Some traditional providers acknowledged that infertility treatment could provide greater financial rewards than treating other conditions, particularly when a successful outcome was attributed to their intervention. However, many also emphasized that their primary motivation was to serve their communities and fulfill a religious or spiritual duty by helping couples experiencing infertility. They generally believed that successful conception ultimately depended on divine will rather than their own abilities. For example, one elderly Hindu traditional healer stated that he never requested payment for infertility treatment because he believed that only God (Ishwar) grants children. Nevertheless, he accepted voluntary gifts from couples who later conceived as a gesture of gratitude rather than as a fee for treatment.

Evidence from Bangladesh indicates that infertility remains a neglected issue within the national public health agenda. Policymakers, government agencies, non-governmental organizations (NGOs), and donor agencies have traditionally prioritized family planning, maternal health, and child health because of concerns related to population growth, maternal mortality, and infant morbidity and mortality. Consequently, infertility has received limited policy attention, partly because of the perceived low prevalence of the condition, the absence of comprehensive national data, and constraints in financial resources, infrastructure, and specialized human resources. As a result, infertility has not been widely recognized as a public health priority requiring government intervention. In the absence of comprehensive public-sector infertility services, the private biomedical sector has become the principal provider of infertility care. However, the high cost of diagnosis and treatment limits access primarily to urban and economically advantaged populations, while poorer and rural couples often rely on informal healthcare providers and traditional healers. Studies conducted among married adolescent women living in urban slums in Dhaka have shown that, because of the limited availability of formal infertility services, health-seeking behavior is frequently influenced by cultural beliefs, misconceptions, and traditional practices.

Despite these challenges, there is growing support for integrating infertility services into reproductive healthcare in developing countries such as Bangladesh. Several authors have argued that health policies in many low- and middle-income countries are often developed

through a top-down approach and are strongly influenced by the priorities and funding agendas of international donors and high-income countries. Consequently, infertility, despite its significant medical, psychological, and social consequences, has remained relatively underrepresented in national health policies. Expanding access to affordable infertility prevention, diagnosis, and treatment services would contribute to a more comprehensive and equitable approach to reproductive health.

The high prevalence of potential risk factors for infertility in Bangladesh, as discussed in the preceding sections, provides a strong rationale for incorporating infertility prevention and treatment into the country's reproductive healthcare system. From a health equity perspective, the absence of accessible infertility services raises important concerns regarding fairness and social justice. Braveman (2003) emphasized that health inequities represent avoidable and unjust differences in access to healthcare and health outcomes. Applying this framework to infertility, it is inequitable that advanced treatments, including assisted reproductive technologies (ART), are largely accessible only to wealthier individuals, while economically disadvantaged couples—who often experience an equal or even greater social and psychological burden of childlessness—remain unable to obtain appropriate care. Furthermore, lower-income populations are disproportionately exposed to many of the established risk factors for infertility, including reproductive tract infections, poor maternal health, malnutrition, and limited access to quality healthcare. Despite their greater need, these groups face the greatest barriers to infertility diagnosis and treatment. Consequently, the current distribution of infertility services in Bangladesh reflects a significant inequity in reproductive healthcare, highlighting the need for policies that promote equitable access to affordable infertility prevention, diagnosis, and treatment services as part of comprehensive reproductive health care. (Nahar, 2012).

Based on the findings of this study and the existing literature, the following recommendations are proposed to improve the prevention, diagnosis, and management of primary infertility among women in Bangladesh:

Integrate infertility prevention into existing reproductive, maternal, newborn, child, and adolescent health (RMNCAH) programs. Public health initiatives should focus on preventing reproductive tract infections, sexually transmitted infections, unsafe abortions, postpartum infections, and genital tuberculosis through health education, vaccination, and timely treatment.

Conduct nationwide awareness campaigns to improve knowledge regarding fertility, age-related decline in fertility, healthy lifestyle practices, and the importance of seeking medical evaluation after 12 months of regular unprotected intercourse (or after 6 months for women aged 35 years or older). Basic infertility evaluation and counseling should be incorporated into primary healthcare facilities. Healthcare providers should be trained to perform initial assessments, provide counseling, identify common causes of infertility, and refer complex cases appropriately.

Infertility should be approached as a condition affecting both partners. Clinical evaluation should include simultaneous assessment of both the male and female partners to avoid unnecessary delays in diagnosis and treatment. District and tertiary hospitals should be equipped with essential diagnostic services, including hormonal assays, semen analysis, pelvic ultrasonography, hysterosalpingography (HSG), and microbiological investigations to facilitate timely diagnosis. Evidence-based national clinical guidelines for infertility diagnosis, treatment, and referral should be developed and implemented to ensure uniform, high-quality care across public and private healthcare sectors. Essential infertility treatments, including ovulation induction, intrauterine insemination (IUI), and selected assisted reproductive technologies (ART), should be made more affordable through government support, insurance schemes, or public-private partnerships. A structured referral pathway should be established to ensure timely referral of patients requiring advanced investigations or assisted reproductive technologies to specialized fertility centers. Obstetricians, gynecologists, family physicians, nurses, laboratory personnel, and allied health professionals should receive regular training in infertility prevention, diagnosis, counseling, and management. Address psychosocial needs: Infertility counseling and psychological support services should be incorporated into infertility clinics to reduce emotional distress, marital conflict, stigma, and social discrimination associated with childlessness.Large-scale epidemiological studies and a national infertility registry should be established to determine the

prevalence, risk factors, treatment outcomes, and barriers to care, thereby supporting evidence-based policy formulation. Infertility should be recognized as an integral component of reproductive health in Bangladesh. National health policies should allocate dedicated resources for infertility prevention, diagnosis, treatment, and research to improve equitable access to infertility care across all socioeconomic groups.

CHAPTER 3:

METHODOLOGY

3.1 Introduction

In this chapter, the study's methodology is discussed. This chapter includes the source of the sample, the study design, the outcome variables, the independent variables, the statistical analyses performed, and the ethical considerations.

3.2 Data source and study design

The study population consisted of women of reproductive age (15 to 49 years) who sought medical assistance at Tertiary Reproductive Health Centers. The health centers were Dhaka Medical College-Gynae and Obs. unit, Bangladesh Medical University-Gynae and Obs. unit, Bangladesh Medical University-Reproductive Endocrinology and Infertility Unit. Data has been collected by a random sampling method. A specially designed questionnaire for research purposes has been used. The questionnaire includes both the demographic characteristics of the population and questions regarding the causes and treatment-seeking patterns of infertility. The data collection lasted for two months. The type and wording of the questions have been carefully selected to preserve participants' anonymity and build confidence. The statistical program SPSS 23(Statistical Package for the Social Sciences) has been used for data analysis. It was a cross-sectional, descriptive study. It has been conducted to find out the risk factors of primary infertility in Bangladeshi female and their health care-seeking behavior. The study was conducted from January to December 2025. To complete the study in time, a work schedule has been prepared depending on the different tasks. The first four months have been spent on literature review, topic selection, and the development of the study protocol. The subsequent months have been spent on questionnaire development and pre –testing, data-collection, compilation and analysis, report writing, printing, and submission of the report.

3.3 Sample Selection:

Primary infertile women of reproductive age group attending the selected centers for infertility and other gynecological issues. Besides infertility, many women may also come for other treatment purposes. But in this study, the study population will be purposively selected after meeting the inclusion criteria and excluding those who do not meet the exclusion criteria.

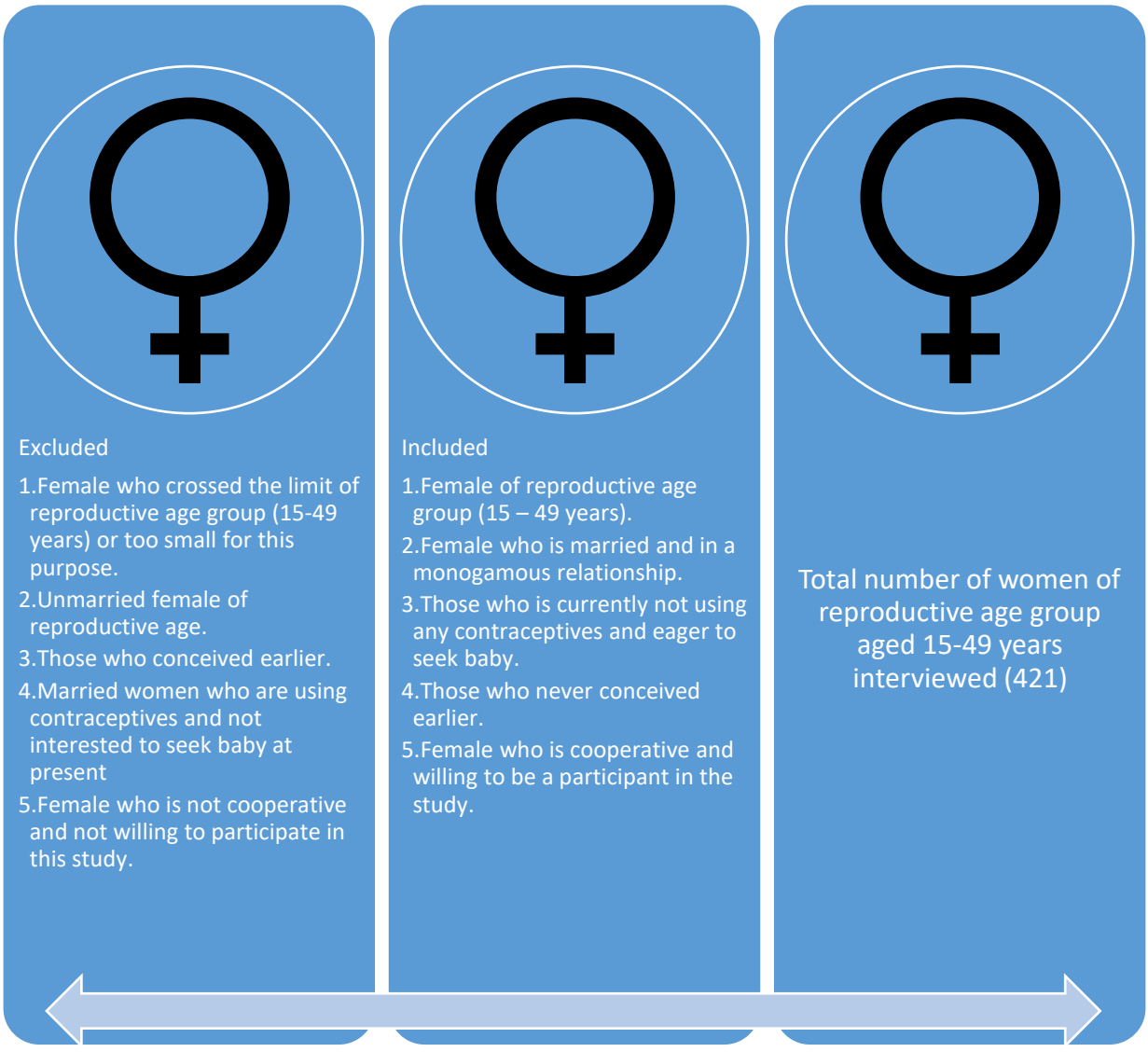


Figure-3.2.1: The flow-chart illustrating the final sample selection for this study

Sample size

Sample size will be determined by using the following formula:

$$n = z^2pq / d^2$$

$$= 1.96 \times 1.96 \times .5 \times .5 /. 05 \times .05 = 384$$

Here, z = 95 % confidence interval

p = Predicted prevalence

q = 1-p

d = Maximum acceptable standard error (5 %)

According to the formula, the study was originally designed to select 384 respondents from the chosen study areas, ensuring a 95% confidence level and a 5% margin of error. Since this is an exit interview, we included a 15% non-response rate, and the estimated sample size increased to 442. To make the study targeted, 450 interviews were planned. The study ultimately conducted interviews with 421 respondents, resulting in a non-response rate of 6.4%.

3.4 Outcome variable

The primary outcome variable of the study was women trying for a baby and health care-seeking behavior for infertility by Bangladeshi women.

3.5 Independent variables

In this study, several independent variables were selected after reviewing the literature on this topic. Here, we selected demographic, socio-economic, reproductive, fertility-related, and healthcare-seeking variables. The demographic variables include- age of the respondent, education status, partner's education, etc. The socio-economic variables include: place of residence, religion, age at marriage, access to health care for infertility services, etc.

3.6 Statistical Analysis

Firstly, descriptive statistics were used to present the frequency and percentage distributions of the explanatory variables and to summarize the findings. Furthermore, a bivariate analysis, including cross-tabulation with chi-square, was conducted, and the results were presented in a table. All the analysis was done using SPSS version 23.

3.7 Ethical Consideration

Before conducting the study at the field level, ethical approval was obtained from the Institute of Disaster Management and Vulnerability Studies, University of Dhaka, Bangladesh (IDMVS) Research Ethics Committee (IDMVS-REC) (Serial Number: ERC(EXT)32/112025 dated: 11 February 2025). A complete review was conducted by the institute's ethics committee, and this study received approval to conduct fieldwork and collect data. Then, each institutional Head (Dhaka Medical College-Gynae and Obs. unit, Bangladesh Medical University-Gynae and Obs. unit, Bangladesh Medical University-Reproductive Endocrinology and Infertility unit) has been provided with a brief of the study and the data-collection questionnaire from their respective institutes. After their approval, data were collected from the relevant participants. Each study participant gave their informed consent before the survey began. The anonymity of the surveys protected the participants' privacy.

CHAPTER 4:

FINDINGS

4.1 Introduction

In this chapter, the study's findings are presented. First, the study's background characteristics are presented. Then, further analysis was done on reproductive health-related issues and in healthcare-seeking behavior.

4.2 Socio-economic and demographic characteristics of the respondents

Table 4.2.1 shows that the largest share of women (32.3%) falls in the 25-29 age category, followed by the 20-24 age group (28.5%), indicating this age group as the most fertile period for women. Whereas only 3.1% of women were in the ≤19.0% of the age group, and 5.9% were in the 40-and-above age category.

Table 4.2.1: Distribution of the Age of the Respondent

Age of the Respondent	Frequency	Percentage
Less than or equal to 19	13	3.1
20-24	120	28.5
25-29	136	32.3
30-34	70	16.6
35-39	57	13.5

Table 4.2.2 shows that more than half (62.2%) of the respondents were from the Dhaka division, with comparatively limited representation from the other divisions, particularly Sylhet (0.5%). Among them, the majority (36.3%) of the respondents lived in City Corporation and urban areas (33.0%) of these divisions, while 26.6% of the women lived in rural areas and only 4.0% lived in Municipality areas of the following divisions.

Table 4.2.2: Division and community types of the Respondent

Divisions	Frequency	Percentage
Barisal	46	10.9
Chattogram	43	10.2
Dhaka	262	62.2
Khulna	25	5.9
Mymensingh	24	5.7
Rajshahi	15	3.6
Rangpur	4	1.0
Sylhet	2	0.5
Type of Community		
Rural	112	26.6
Urban	139	33.0
Municipality	17	4.0
City Corporation	153	36.3

Almost all respondents were married (99.8%), and the majority (88.8%) were Muslim (Table 4.2.3). More than half of the respondents (54.6%) were from single-family households, while the rest (45.4%) were from joint-family households. In terms of educational status, the majority (53.9%) of respondents had higher secondary (HSC and equivalent) education, while 31.6% of women had not completed secondary education. On the other hand, the percentage of BA/BSC and equivalent (9.5%) was relatively low. Most of them received education through the general mode (91.3%).

Table 4.2.3: Marital status, religion, and household type of the Respondent

Marital Status	Frequency	Percentage
Currently married	420	99.8
Divorced	1	0.2
Religion		
Islam	374	88.8
Hinduism/ Satanism	46	10.9
Christianity	1	0.2
Type of household		
Single	230	54.6
Joint	191	45.4
Educational level of the respondent	**Frequency**	**Percentage**
No Education	5	1.2
Primary incomplete	5	1.2

Primary Complete	11	2.6
Secondary incomplete	133	31.6
HSC and equivalent	227	53.9
BA/BSC and equivalent	40	9.5
Mode of study		
General	380	91.3
Technical	5	1.2
Religious	31	7.5

The occupational status of the respondents shows that most were housewives (75.3%), with limited participation in paid employment, while 5.5% were students (Table 4.2.4). In terms of husband's occupation, the largest share was employed in service-related professions (43.2%), followed by factory workers (20.7%) and small business activities (20.4%).

Table 4.2.4: Occupation of the Respondent and husband

Characteristics	Frequency	Percentage
Respondent's occupation		
Housewife	317	75.3
Student	23	5.5
Teacher	22	5.2
Factory Worker	24	5.7
Services	20	4.9
Small Business	15	3.6
Husband's occupation		
Services	182	43.2
Large businesses	42	10.0
Factory workers	87	20.7
Small business	86	20.4
Unemployed	8	1.9
Rickshaw/ Van/ Truck/ Bus Driver	16	3.8

Regarding husbands' education, most (52.0%) had HSC or equivalent, and the second-largest group (21.4%) had BA/BSc or equivalent (Table 4.2.5). Whereas 17.1% of the husbands had secondary incomplete, the mode of study was general for the majority (90.8%).

Table 4.2.5: Education level and mode of study of the Respondent's husband

Characteristics	Frequency	Percentage
Educational level of the husband		
No Education	15	3.6
Primary incomplete	11	2.6
Primary Complete	14	3.3
Secondary incomplete	72	17.1
HSC and equivalent	219	52.0
BA/BSC and equivalent	90	21.4
Mode of study of the husband		
General	367	90.8
Technical	14	3.5
Religious	23	5.7

Table 4.2.6 shows the age at marriage of the respondents. More than half of the respondents (53.0%) were married at ages 18-24 years, while 26.8% were married at ≤17 years, indicating the persistence of child marriage.

Table 4.2.6: Age of marriage of the Respondent

Age at marriage	Frequency	Percentage
Less than or equal to 17	113	26.8
18-24	223	53.0
25-29	58	13.8
30-34	19	4.5
35 and above	8	1.9

Among the respondents, 23.5% of them belonged to the BDT 20001-30000 income category, which is the largest proportion in the family income category, whereas a small portion of the respondents belonged to the BDT 50001-60000 (5.0%) and BDT 60001 and above (6.4%) income ranges (Table 4.2.7). The mean family income was BDT 37817.10 (SD = 35244.89), indicating substantial variability in income levels among households. Most respondents (31.4%) reported daily media exposure, whereas 23.5% reported no media exposure.

Table 4.2.7: Family Income and Media Exposure of the Respondent

Characteristics	Frequency	Percentage
Family Income (BDT)		
4000-10000	29	6.9
10001-20000	93	22.1
20001-30000	99	23.5
30001-40000	88	20.9
40001-50000	64	15.2
50001-60000	21	5.0
60001 and above	27	6.4
Mean and SD	37817.10(M)	3524.89(SD)
Media exposure		
Not at all	99	23.5
Everyday	132	31.4
One day a week	119	28.3
Less than a week	71	16.9

4.3 Mental Health

For most items, a large proportion reported that the symptoms were not applicable, indicating generally low severity for several stress and anxiety-related experiences (Table 4.3.1). For example, 66.5% reported no breathing difficulties, 54.6% did not find it hard to wind down or experience trembling hands, 54.9% did not feel scared without reason, 54.4% were not aware of heart action without physical exertion, and 53.2% experienced a lack of concentration. However, a notable proportion of respondents reported experiencing psychological symptoms to a considerable degree or very much. Feelings of overreacting to situations were relatively common, with 20.9% reporting a considerable degree and 20.2% reporting a very high degree. Similarly, mental pressure was reported at a considerable or very high level by 37.8% of respondents, while being touchy was reported by 38.9%. Feeling downhearted and blue was also prominent, with 26.4% reporting it to a considerable degree and 15.4% to a very great degree. Indicators of reduced positive effects and motivation were also evident. Nearly one-third of respondents reported considerable or high difficulty in feeling positive emotions (28.7%), becoming enthusiastic (20.7%), or feeling that life was worth much as a person (26.4%). Additionally,

difficulty winding down and lack of initiative were reported to a considerable or very high degree by 17.4% and 18.7% of respondents, respectively.

Table 4.3.1: Mental status of the Respondent

Mental Health Condition	Applied to			
	Not applicable	some degree	considerable degree	Very much
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Find it hard to wind down	230 (54.6)	118(28.0)	55(13.1)	18(4.3)
Awareness of the dryness of the mouth	206(48.9)	148(35.2)	38(9.0)	29(6.9)
Seems to have a positive feeling	134(31.8)	166(39.4)	83(19.7)	38(9.0)
Experiencing breathing difficulty	280(66.5)	107(25.4)	20(4.8)	14(3.3)
Difficult to work up the initiative to do things	209(49.6)	133(31.6)	49(11.6)	30(7.1)
Tend to overreact to situations	136(32.3)	112(26.6)	88(20.9)	85(20.2)
Trembling experience in hand	230(54.6)	132(31.4)	45(10.7)	14(3.3)
Feeling mental pressure	127(30.2)	135(32.1)	93(22.1)	66(15.7)
Feeling panic and making a fool of herself	217(51.5)	138(32.8)	42(10.0)	24(5.7)
Feeling of nothing to look forward to	205(48.7)	117(27.8)	65(15.4)	34(8.1)
Getting agitated easily	222(52.7)	128(30.4)	51(12.1)	20(4.8)
Feeling downhearted	99(23.5)	146(34.7)	111(26.4)	65(15.4)
Feeling of intolerance	208(49.4)	126(29.9)	59(14.0)	28(6.7)
Condition close to panic	185(43.9)	146(34.7)	66(15.7)	24(5.7)
Unable to become enthusiastic about anything	220(52.3)	114(27.1)	56(13.3)	31(7.4)
Feeling of worthlessness as a person	205(48.7)	105(24.9)	60(14.3)	51(12.1)
Feeling excessive emotional	122(29.0)	135(32.1)	86(20.4)	78(18.5)
Aware of the action of the heart in the absence of any physical exertion	229(54.4)	119(28.3)	56(13.3)	17(4.0)
Feeling scared about anything without a good reason	231(54.9)	127(30.2)	48(11.4)	15(3.6)

4.4 Anthropometric Profile of Respondents

Based on BMI, one-third of the respondents (34.9%) reported a normal weight (18.5-24.9), while the majority were above the normal range, with 33.3% overweight (Table 4.4.1). In terms of self-perceived weight status, 60.6% perceived themselves as overweight, and the opposite has also been seen, as 5.9% thought they were underweight.

Table 4.4.1: BMI and body Weight of the respondents

BMI and Body Weight	Frequency	Percentage
BMI		
Less than 18.5 (Underweight)	12	2.9
18.5-24.9 (Normal weight)	147	34.9
25.0-29.9 (Overweight)	140	33.3
30.0-39.9 (Moderate obesity)	105	24.9
35.0-39.9 (Severe obesity)	12	2.9
40.0 and above (Morbid obesity)	5	1.2
Weight Condition		
Underweight	25	5.9
Normal weight	134	31.8
Overweight	255	60.6
Obese	7	1.7

For most respondents (34.7%), the reason for obesity was hormonal imbalance, whereas 15.0% reported lack of exercise as the reason (Table 4.4.2).

Table 4.4.2: Reasons for Obesity of the respondents

Reasons for Obesity	Frequency	Percentage
Hormonal imbalance	146	34.7
Eating extra food	60	14.3
Lack of exercise	63	15.0
Genetics	22	5.2
Surgical/Medical	19	4.5
Disease	14	3.3
Do not know	14	3.3

4.5 Fertility-Related and Reproductive Health Characteristics

Table 4.5.1 shows that 34.0% of respondents had been married for 3-5 years, with the majority married for 3-8 years. A similar pattern was observed for the duration of trying for a baby, where about one-third had been trying for 3-5 years. Most women (61.5%) had trouble conceiving within the first 1-2 years, and nearly half (48.2%) sought treatment within one year of recognizing the problem.

Table 4.5.1: Marriage, Fertility, and reproductive history of the respondents

Fertility and Reproductive Health issues	Frequency	Percentage
Duration of marriage (Year)		
1-2	39	9.3
3-5	143	34.0
6-8	117	27.8
9-12	66	15.7
13-15	28	6.7
16 years and above	28	6.7
Time duration for seeking a baby (Year)		
1	96	22.8
3-5	146	34.7
6-8	84	20.0
9-1	60	14.3
13-15	19	4.5
16 years and above	16	3.8
Realization of the difficulty in having a baby (Year)		
1-2	259	61.5
3-5	122	29.0
6-8	25	5.9
9-12	10	2.4
13+	5	1.2
Time between understanding the difficulty and seeking treatment (Year)		
1	203	48.2
2	50	11.9
3	55	13.1
4	41	9.7
5	32	7.6
6	17	4.0
7 years and above	23	5.5

4.6 Evaluation of Infertility Causes and Diagnostic Findings

While reporting the reasons for infertility, 41.8% reported irregular menstruation, 27.3% had reported being overweight (Table 4.6.1). Ovarian cysts were present in 18.1% of women, while other factors were present in a smaller proportion.

Table 4.6.1: Probable Causes for Infertility

Causes of infertility	Frequency	Percentage
Irregular menstruation	176	41.8
Overweight	115	27.3
An identified cyst in the ovary	76	18.1
Known or unknown disease	45	10.7
Hormonal	38	9.0
Hypertension	34	8.1
Egg production problem	25	5.9
Tube Block	25	5.9
Thyroid	23	5.5
Husband's problem	19	4.5
PCOS	17	4.0
Diabetes	16	3.8
Cyst operation	14	3.3
Uterus problem	13	3.1
Malnutrition	6	1.4
Anemic	3	0.7
Tuberculosis	3	0.7

Table 4.6.2 shows that nearly half of the respondents (41.3%) had taken a gap between marriages and having babies; most of them had taken the gap for 1-2 years. Perhaps 37.9% of them took the method during the gap period.

Table 4.6.2: Primary Infertility history of the respondents

Causes	Frequency	Percentage
Taking a gap between marriage and conceiving a baby		
Yes	174	41.3
No	257	58.7
Duration of gap between marriage and seeking a baby (Year)		
1	63	36.2
2	64	36.8
3	24	13.8

4	12	6.9
5	6	3.4
6 +	5	2.9
Contraceptive methods in the gap period		
Yes	66	37.9
No	108	62.1

Figure 3 shows that most of the respondents (65.2%) had taken an oral contraceptive pill during the gap period, while 43.9% had used a condom with their husband. On the other hand, 6.1% had used the withdrawal method.

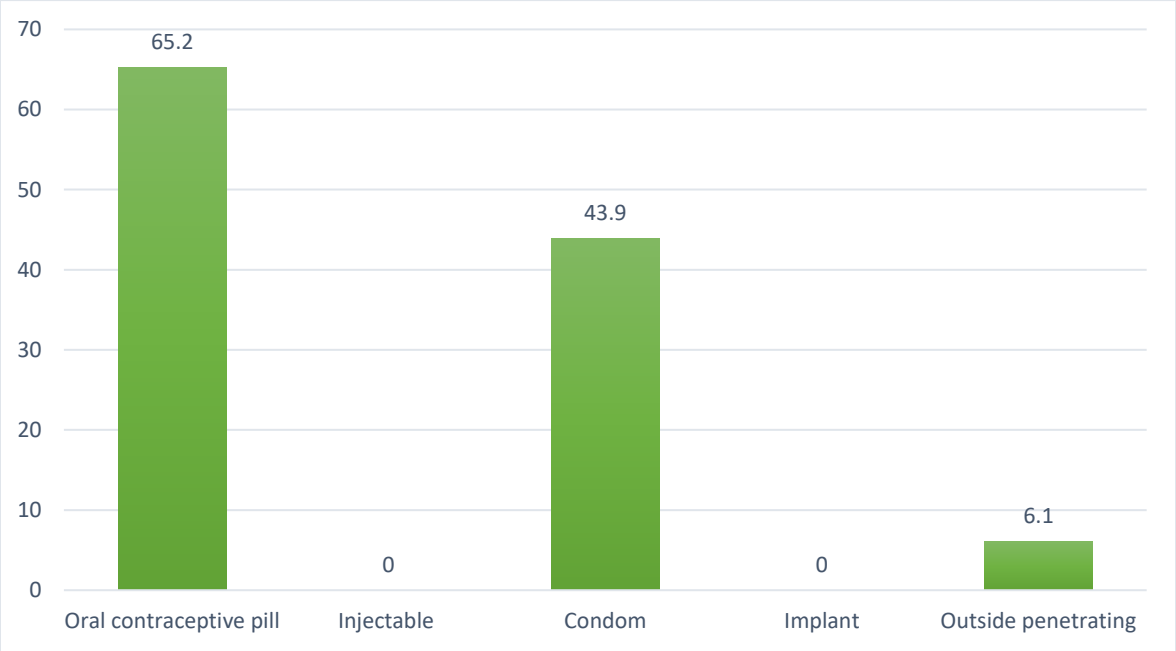


Figure 4.1: Types of Contraception used by the respondents

Table 4.6.3 shows that most of the respondents (66.3%) reported that they were clinically diagnosed with the causes of infertility, among them 77.4% had gone through a pelvic examination of the uterus. 86.5% had done ultrasonography or other transvaginal investigations, among them 35.7% had found abnormalities in internal organs and 31.6% done further laparoscopy. Some respondents have been identified as having a problem with their hormonal levels. The following table shows the measures taken by respondents with such issues. For

balancing the hormonal levels of those who have such issues, 67.0% had taken hormonal pills, and 28.0% had taken hormonal injections.

Table 4.6.3: Infertility diagnosis and management history of the respondents

Infertility Diagnosis	Frequency	Percentage
Clinically diagnosed with the causes of infertility	279	66.3
Pelvic examination by a physician	326	77.4
Investigations related to Infertility		
Ultrasonography or other transvaginal investigations	364	86.5
Abnormal findings in internal organs	130	35.7
Laparoscopy for infertility	133	31.6
Measures of Balancing Hormonal level		
Took a hormonal pill	146	67.0
Hormonal Injections	61	28.0
No measure to normalize the hormonal level	11	5.0

Table 4.6.4 reveals that half of the respondents (50.8%) had a regular menstrual cycle, while 30.9% of them had a family history of sub-fertility. Only 16.9% reported having chronic medical conditions, while 15.4% had pelvic disease or genital infection. One-third of the respondents (35.2%) had diabetes, while 22.5% had thyroid, and 12.7% had PCOS.

Table 4.6.4: Risk Factors associated with sub-fertility

Statement of Health	Frequency	Percentage
History of regular menstrual cycle	214	50.8
Family history of sub-fertility	130	30.9
Patients with chronic medical conditions	71	16.9
History of pelvic disease or genital infection	65	15.4
History of health conditions		
Diabetes	25	35.2
Thyroid	16	22.5
PCOS	9	12.7
Blood pressure	5	7.0
Breathing difficulties	4	5.6
Allergy	4	5.6
Hormones imbalance	3	4.2
Cyst	2	2.8
STD	1	1.4
Others	6	8.5

Table 4.6.5 shows that most respondents experienced their 1st menstrual period between ages 12 and 15 years, with the largest proportion (28.3%) at age 12 years. Among the respondents, 35.2% reported a gap of 26-30 days between menstrual cycles, indicating a normal cycle, while 13.8% reported a gap of 46 days or more, indicating an irregular cycle. The majority used 2-4 pads per day, with 32.8% reporting 3 pads per day during menstruation. On the other hand, 45.8% of them change sanitary napkins or clothes every 5-7 hours, while 20.0% change every 11-13 hours, which is not a good practice.

Table 4.6.5: Menstrual health conditions of the respondents

Menstrual Health	Frequency	Percentage
Age of the onset of menstruation (Year)		
9 year	4	1.0
10	9	2.1
11	15	3.6
12	119	28.3
13	86	20.4
14	80	19.0
15	62	14.7
16	34	8.1
17 +	12	2.8
Gap between two menstrual cycles (days)		
<15	23	5.5
16-20	30	7.1
21-25	43	10.2
26-30	148	35.2
31-35	41	9.7
36-40	39	9.3
41-45	39	9.3
46 +	58	13.8
Flow during menstrual cycle (Pad/day)		
1	23	5.5
2	106	25.2
3	138	32.8
4	86	20.4
5	44	10.5
6	11	2.6
7 pads and above	13	3.1
Changing time of pad/clothes(hours)		
2-4	56	13.3
5-7	193	45.8
8-10	78	18.5
11-13	84	20.0
14 hours and above	10	2.4

4.7 Pregnancy-related issues

Table 4.7.1 shows that among the respondents, 28.3% had conceived after marriage, but the outcome was not satisfactory. In 21.1% cases, the outcome of pregnancy was abortion, while for 4.3% it was stillbirth. There were 2.4% of cases in which the respondents performed an MR to terminate their pregnancy at that time.

Table 4.7.1: Pregnancy-related issues of the respondents

Pregnancy Related Issues	Frequency	Percentage
No. of women who have ever conceived	119	28.30
Fate of Pregnancy		
Abortion	89	21.1
Still Birth	18	4.3
MR	10	2.4
Ectopic pregnancy	2	0.5

Table 4.7.2 shows that for doing MR/abortion/ectopic pregnancy or stillbirth, 21.0% of the respondents had gone to the Tertiary government health facilities, while the majority (47.1%) were at home. Half of the respondents (54.6%) faced complications during MR/abortion/ectopic pregnancy or stillbirth, among them 61.5% had excessive bleeding, 41.5% had irregular period. While reporting abortion, 87.6% reported that they had spontaneous abortions, while 7.9% had accidental abortions.

Table 4.7.2: Types of Health facilities for managing pregnancy outcome (MR/ abortion/ ectopic pregnancy or delivering stillbirth)

Types of Health Facilities	Frequency	Percentage
Tertiary govt. health facilities	25	21.0
Upazila govt. hospitals	20	16.8
Private health facilities	8	6.7
Untrained personnel's chamber/home	5	4.2
NGO clinics	4	3.4
Union health and family welfare center	1	0.8
Home	56	47.1

4.8 Primary Infertility-related Treatment-seeking behavior

Table 4.8.1 shows that more than three-fourths of the respondents (77.6%) received treatment for primary infertility, where treatment seeking was largely initiated by the couple themselves (88.6%), and household members advised 39.7%.

Table 4.8.1: Health-seeking behavior of the respondent

Health-seeking behavior	Frequency	Percentage
History of receiving primary infertility treatment	323	77.6
Infertility treatment seeking advice taken from		
Self-seeking by a couple	373	88.6
Household members	167	39.7
Neighbors	9	2.1
Doctor	1	0.2
Nurse	1	0.2
Self	4	1.0

Table 4.8.2 shows that the majority sought treatment from formal healthcare providers, particularly OBGYNs (91.3%), medical college hospitals (81.4%), and specialized doctors (75.2%). A similar pattern was found regarding taking advice for infertility treatment, where 91.3% respondent taken advised from an OBGYN and 75.2% from a specialized doctor.

Table 4.8.2: Types of Healthcare Centers Accessed for Primary Infertility Treatment

Centers for receiving infertility treatment	Frequency	Percentage
OBGYN	295	91.3
Medical College Hospital	263	81.4
Specialist/specialized doctor	243	75.2
Specialized government hospital	189	58.5
Private hospital	107	33.1
District hospital	89	27.6
General doctor (MBBS)	74	22.9
Private clinic	64	19.8
Upazila Health Complex	31	9.6
Private Medical College Hospital	18	5.6
Village doctor's chamber	10	3.1
Mother and Child Welfare Center	8	2.5
Community clinic	8	2.5
Community health provider (CHCP)	7	2.2
Others*	18	5.6

*others = Union health and family welfare center, Permanent NGO clinic, Pharmacy, Satellite NGO Clinic, Registered doctor's chamber, Nurse/midwife/paramedic, FWV, Medical officer (SACMO), Health assistant (FWA)

Table 4.8.3 shows that the majority of respondents visited 1-3 treatment providers on average, with 27.3% visiting 2 treatment providers for infertility treatment.

Table 4.8.3: Duration of infertility treatment and number of providers visited

Average duration of infertility treatment (years)	Frequency	Percentage
1	280	66.5
2	46	10.9
3	30	7.1
4	29	6.9
5	9	2.1
6	6	1.4
7	8	1.9
8 years and above	13	3.1
Average number of treatment providers visited.	**N**	**(%)**
1	94	22.3
2	115	27.3
3	86	20.4
4	48	11.4
5	34	8.1
6	14	3.3
7	7	1.7
8 and above	23	5.5

Table 4.8.4 shows that despite extensive treatment-seeking, outcomes were mixed, with over half reporting no positive outcome (55.1%) or continuing treatment with hope (55.8%), while only 15.0% had conceived but remained unsuccessful. When treatment did not produce the desired outcome, the most common response was changing doctors, reported by 73.2% of respondents. A substantial proportion (41.6%) temporarily stopped treatment, while 19.4% were still in the initial phase of care. Very few respondents (3.1%) reported turning to supernatural beliefs.

Table 4.8.4: Treatment-related outcome of the respondents

Outcome of the treatment	Frequency	Percentage
Continuing medicine with hope	235	55.8
No positive outcome	232	55.1
Problem identified	221	52.5
Conceived but not successful	63	15.0
If the treatment did not respond, then what was the next step		
Changing doctors	308	73.2
Stop treatment for a while	175	41.6

Started believing in supernatural power	13	3.1
Frist visit	69	19.4
What phases of infertility treatment have you completed?		
Consulting a treatment	406	96.4
Being diagnosed with the problem	295	70.1
Receiving advice	347	82.4
Using the treatment	286	67.9
Successful in conceiving	22	5.2

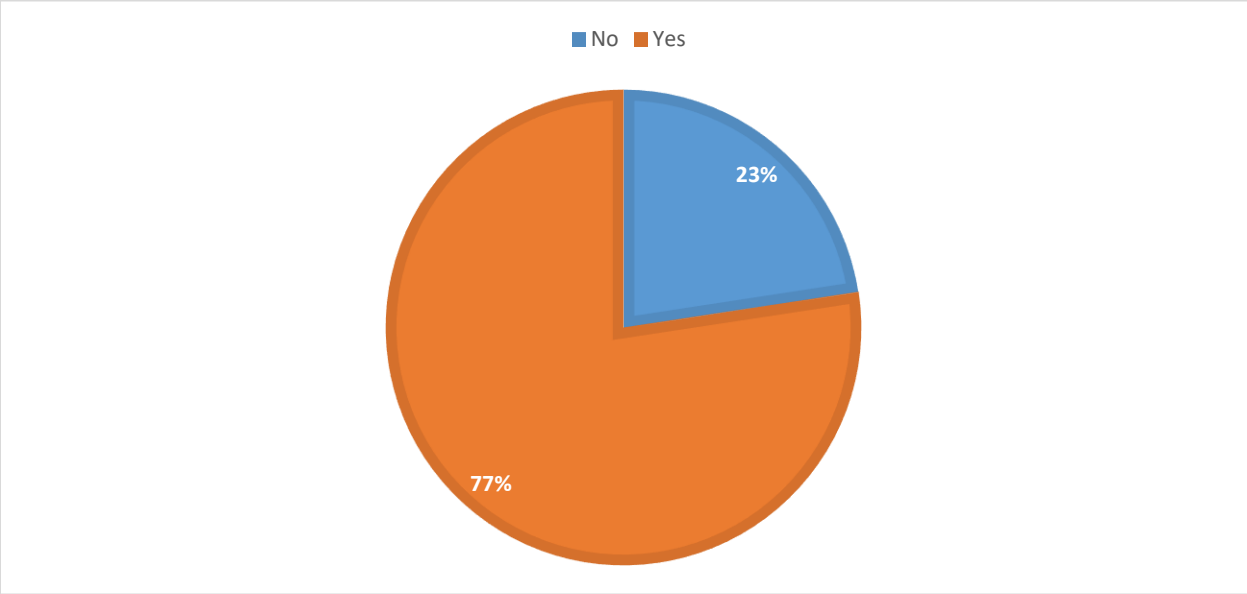


Fig 4.8.1: Proportion of respondents who received treatment for primary infertility

The pie chart shows the treatment-seeking behavior of the primary infertile respondent. Among the respondents, 77.0% received treatment for sub-fertility, while the rest of them didn't receive any treatment earlier (Figure 4).

Treatment preference of a couple

The following table shows that many respondents received infertility treatment multiple times from different health facilities. In most centers, including specialized government hospitals, medical college hospitals, district hospitals, private hospitals, and private clinics, the largest proportion of respondents reported receiving treatment more than three times, indicating prolonged and repeated engagement with infertility services. Multiple visits were also common in lower-level facilities, including Upazila health complex, community clinics, and village doctors' chambers.

Regarding the average duration of treatment, women who received treatment from only one or two centers mostly reported shorter durations, usually less than one year. In contrast, those who visited more than three centers were much more likely to receive long-term treatment, with most receiving care for more than three years.

Table 4.8.5: Preference for infertility treatment of a couple

Treatment Facilities	Treatment Received			
	1	2	3	3+
	N (%)	N (%)	N (%)	N (%)
Specialized government hospital	7(3.7)	58(30.7)	49(35.9)	75(39.7)
Medical College Hospital	10(3.8)	79(30.0)	70(26.6)	104(39.5)
District hospital	2(2.2)	23(25.8)	25(28.1)	39(43.8)
Mother and Child Welfare Center	1(12.5)	-	2(25.0)	5(62.5)
Upazila Health Complex	1(3.2)	9(29.0)	5(16.1)	16(51.6)
Union health and family welfare center	-	-	-	3(100)
Community clinic	-	2(25.0)	-	6(75.0)-
Permanent NGO clinic	-	-	1(33.3)	2(66.7)
Satellite NGO Clinic	-	1(50.0)	1(50.0)	-
Private Medical College Hospital	1(5.6)	5(27.8)	3(16.7)	9(50.0)
Private hospital	3(2.8)	22(20.6)	23(21.5)	59(55.1)
Private clinic	1(1.6)	14(21.9)	11(17.2)	38(59.4)
Registered doctor's chamber	-	1(50.0)	-	1(50.0)
Village doctor's chamber	1(10.0)	1(10.0)	1(10.0)	7(70.0)
Pharmacy	-	1(33.3)	-	2(66.7)
Average duration of the treatment				
Less than 1 year	79(31.3)	77(30.6)	55(21.8)	41(16.3)
1-3 years	12(11.5)	31(29.8)	20(19.2)	41(39.4)
More than 3 years	3(4.6)	7(10.8)	11(16.9)	44(67.7)

The findings from Table 4.8.6 show a clear relationship between the number of treatments received and the likelihood of conception. Only 11.7% of women who received one treatment were able to conceive. The proportion of successful conception increased among those who received two treatments (25.2%) and three treatments (29.1%). The highest success rate was observed among women who received more than three treatments, with 42.9% conceiving, indicating that repeated treatment was associated with a greater chance of conception.

Table 4.8.6: Respondents who received treatment in different orders and conceived

Treatment received	Frequency	Percentage	Able to conceive	
			Frequency	Percentage
One treatment only	94	22.3	11	11.7
Two treatments only	115	27.3	29	25.2
Three treatments only	86	20.4	25	29.1
More than three treatments	126	29.9	54	42.9

Table 4.8.7shows the total number of respondents across different phases of infertility treatment and by treatment order. A total of 86**,** 110**,** 84, and 126 women consulted first-, second-, third-, and more-than-three-order treatments, respectively. Almost all respondents, regardless of treatment number, reported consulting a healthcare provider, but progression through later phases increased with repeated treatments. Women who received more than three treatments were most likely to proceed through subsequent phases, including diagnosis, receiving advice, and using treatment. Successful conception was not reported among women who received only one treatment. In contrast, it was reported among those who received two treatments (6 women)**,** three treatments (2 women), and was highest among those who received more than three treatments (14 women)**.**

Table 4.8.7: Percentage of respondents who received different types of treatments

Treatment received	Treatment Phase				
	Consulting N (%)	Problem Identified N (%)	Receive advice N (%)	Continuing treatment N (%)	Conceived N (%)
Single treatment	86	52	68	45	0
Treatments received twice	110	84	97	85	6
Treatments received three times	84	69	75	59	2
Treatments received more than three times	126	90	107	97	14

The treatment available in the health facilities (both private and Public):

Most respondents received investigations and advice (90.5%)**,** followed by vitamins with advice (61.0%) and treatment for hormonal abnormalities (55.6%); less than half received ovulation-inducing medications (42.8%) (Table 4.8.8). In comparison, advanced treatments such as IVF or

intra-uterine procedures were rare (3.8%)**.** The majority (80.3%) continued their treatment. In comparison, many of them (72.2%) changed doctors as the earlier doctor was not successful, whereas seeking a second opinion or choosing a doctor with a better reputation were fewer common reasons.

Table 4.8.8: Treatment available in the health facilities

Types of treatment received	Frequency	Percentage
Investigation and advice	381	90.5
Vitamins and advice	257	61.0
Treatment for hormonal abnormalities	234	55.6
Ovulation-inducing medications	180	42.8
Could not mention	51	12.1
In vitro fertilization/intra-uterine treatment	16	3.8
Did you continue the treatment Q 511	338	80.3
Reason for changing doctors		
The treatment from the earlier doctor was not successful	255	60.6
Not applicable	68	16.2
Wanted a second opinion	30	7.1
Heard another doctor had a good reputation	27	6.4
First visit	22	5.2
Wanted a more modern doctor	6	1.4
Felt earlier doctors didn't pay proper attention	6	1.4
Financial problem	6	1.4
Refer	1	0.2

Received Allopathic treatment

Women who did not seek allopathic treatment were asked to report their reasons for not doing so. The majority reported waiting for a natural pregnancy (44.9%). Nearly half (38.7%) reported that they did not feel treatment was necessary, while 8.4% reported that the treatment was expensive and they could not afford it (Figure 5).

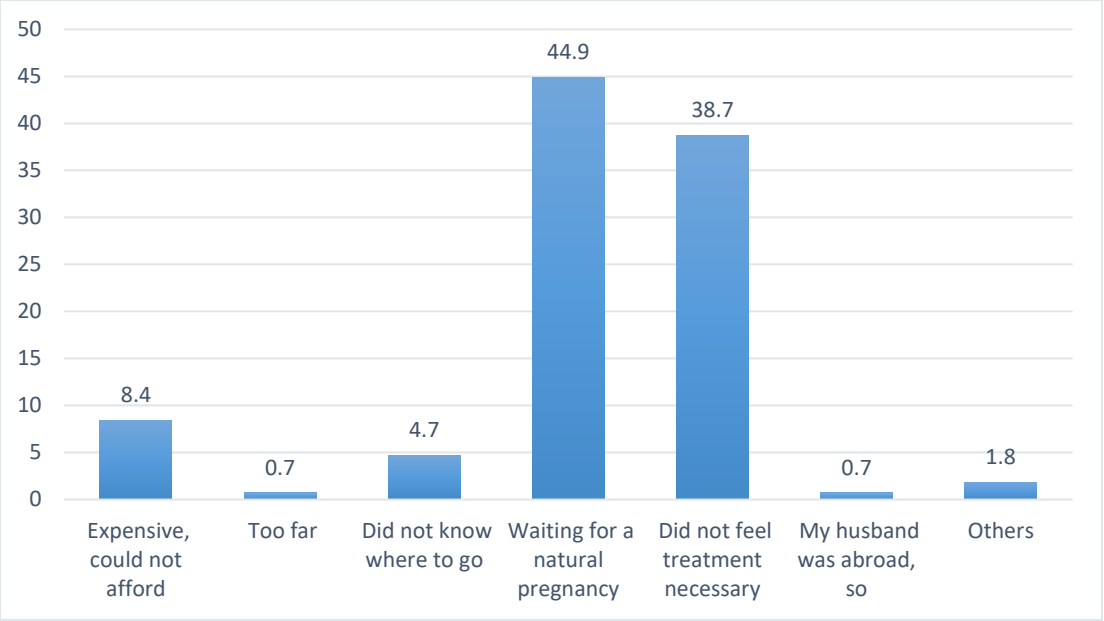


Figure 4.8.2: Reasons for not seeking allopathic treatment for primary infertility

Table 4.8.9 shows that the proportion of individuals who went abroad for infertility treatment was relatively low (1.9%). Regarding visiting abroad for infertility treatment, 75.0% reported that they had gone to India for treatment, while 25.0% had gone to Saudi Arabia. Most of them (62.5%) financed infertility treatment through their own or their spouse's earnings, while 37.5% relied on borrowed money. For many respondents (62.5%), the problem was identified abroad, while 37.5% conceived but couldn't continue.

Table 4.8.9: Country visited for primary infertility treatment purposes

Infertility treatment investment	Frequency	Percentage
Respondents who went abroad for infertility treatment	8	1.9
Country visited for infertility treatment purposes.		
India	6	75.0
Saudi Arabia	2	25.0
Source for infertility treatment		
Self/spouse earning	5	62.5
Borrowed money	3	37.5
Outcome of the treatment abroad		
Problem identified	5	62.5
Conceived but couldn't continue	3	37.5

From Table 4.8.9, it is evident that, for treatment purposes, the majority of respondents' husbands (82.9%) accompanied them, and 84.6% of these husbands underwent the necessary tests.

Table 4.8.10: Husbands' participation during treatment

Husbands' participation during treatment	**Frequency**	**Percentage**
Husband accompanied the respondent while seeking infertility treatment	349	82.9
Husband undergoes necessary tests during infertility treatment	356	84.6

4.9 Infertility-related socio-behavioral consequences

From Table 4.9.1, it is observed that many respondents reported happy (90.5%) and normal (97.4%) relationships with their husbands before the diagnosis of infertility. In contrast, only 5.7% reported an unhappy relationship. The majority of respondents could talk about infertility freely with their spouse (95.5%) and family members (76.5%). On the other hand, most respondents (61.2%) reported feeling irritated about not having children. Nearly half (46.3%) considered infertility to be a disease, while 43.9% felt inferior to other women because of childlessness. In contrast, fewer respondents attributed infertility to supernatural causes (14.5%) or perceived any change after being diagnosed (11.2%). Only a small proportion of respondents reported being instructed to follow specific activities related to infertility. About 6.2% were advised not to help others lift heavy objects, while fewer restrictions were reported on avoiding contact with other infertile women (2.4%). About 2.9% were restricted to eating only dal and rice without animal protein, while a negligible proportion (0.2%) avoided food cooked by menstruating women. Among the respondents, 27.6% reported experiencing social exclusion within the family, while 24.0% reported experiencing social exclusion in society or at social gatherings. Moreover, 15.9% experienced psychological violence in the family, whereas 1.2% experienced any physical violence due to infertility. Regarding the first investigation and treatment among infertile couples, the majority (82.9%) reported that both should visit treatment providers, while 16.4% reported that the wife should be first investigated and treated.

Table 4.9.1: Social, economic, and familial consequences of infertility

Socio-behavioral consequences of the spouse and others	Frequency	Percentage
Relationship between the respondent and husband before the diagnosis of infertility		
Happy	381	90.5
Unhappy	24	5.7
Abusive	3	0.7
Could talk to spouse freely about infertility	402	95.5
Could talk to family members freely about infertility	322	76.5
Self-irritation by the fact of not having children	256	61.2
Considering infertility, a disease	195	46.3
Feeling inferior to other women due to infertility	185	43.9
Considering supernatural causes for infertility	61	14.5
Realizing changes in the relationship after diagnosing infertility	47	11.2
Instructions to observe rituals due to infertility		
Not to help others with lifting heavy things	26	6.2
Not to talk to other infertile women	10	2.4
Not to see a dead body or attend funerals	9	2.1
Not to dry clothes in an open space outside the home	9	2.1
Dietary Restrictions		
Only dal and rice, no animal protein	12	2.9
Food cooked by menstruating women	1	0.2
Statement		
Feeling of social exclusion by family members	116	27.6
Feeling of social exclusion in society or any social gathering	101	24.0
Experiencing psychological violence in the family	67	15.9
Experiencing exclusion from friends	47	11.2
Experiencing physical violence due to infertility	5	1.2
Perception of first investigated and getting treatment among infertile couples		
Both	349	82.9
Wife	69	16.4
Husband	3	0.7

4.9.1 Factors associated with health-seeking behavior for sub-fertility.

In Table 4.9.2, it is observed that Binary logistic regression was performed to assess the impact of several factors on health-seeking behavior regarding sub-fertility. The variables that were statistically significant in the chi-square analysis were included in this regression model to assess whether they truly affect treatment-seeking behavior for sub-fertility. An odds ratio greater than

1 indicates higher odds of receiving treatment, while an odds ratio less than 1 indicates lower odds compared to the reference category. Among the socio-demographic variables, division showed a significant association with treatment-seeking behavior. Respondents from Chattogram were about 15.3 times more likely to have received treatment compared to those from Barisal (AOR=15.294, CI=2.600-89.950). Although respondents from Dhaka, Khulna, and other divisions had higher odds of treatment uptake, these associations were not statistically significant. The extremely large or zero odds ratios observed for Rangpur and Sylhet likely indicate sparse data or small sample size issues in those categories. Age, media exposure, family income, and age at marriage were not significantly associated with ever having received treatment. Although some age groups, such as 20-24 years and 40 years and above, showed higher odds of treatment uptake compared with respondents aged ≤19 years, these associations were not statistically significant. Duration of marriage showed an important relationship with treatment-seeking behavior. Women who had been married for 6-8 years were about 6.2 times more likely to have ever received treatment compared to those married for 1-2 years (AOR=6.162, CI=1.307-29.056). Similarly, respondents trying for a baby for 3-5 years had approximately 3 times higher odds of receiving treatment than those trying for 1-2 years (AOR=3.051, CI=1.276-7.298). These findings suggest that longer marital duration and prolonged attempts to conceive may increase the likelihood of seeking treatment. Regarding reproductive and health-related characteristics, women with a regular menstrual cycle had significantly lower odds of receiving treatment compared to those with irregular cycles (AOR=0.222, CI=0.109-0.450). Likewise, respondents with pelvic disease or genital infection were significantly less likely to have received treatment (AOR=0.241, CI=0.076-0.768). The history of taking specific medications and chronic medical conditions was not significantly associated with treatment-seeking behavior.

Table 4.9.2: Health-seeking behavior for sub-fertility by their background characteristics

Socio-demographic characteristics	Ever received treatment	
	Adjusted OR	CI (95%)
Age		
≤19	1	
20-24	1.791	0.369-8.704
25-29	0.615	0.094-4.003
30-34	2.149	0.220-21.002
35-39	0.802	0.049-13.179
40 and above	2.373	0.042-134.054
Division		
Barisal	1	
Chattogram	15.294***	2.600-89.950
Dhaka	2.270	0.901-5.721
Khulna	2.747	0.609-12.380
Mymensingh	0.675	0.126-3.606
Rajshahi	1.910	0.360-10.147
Rangpur	2.48	0.00
Sylhet	0.000	0.00
Media exposure		
Not at all	1	
Everyday	1.461	0.567-3.764
One day a week	0.505	0.202-1.260
Less than a week	0.530	0.194-1.444
Family Income		
4000-10000	1	
10001-20000	2.195	0.483-9.964
20001-30000	1.256	0.298-5.300
30001-40000	0.876	0.200-3.828
40001-50000	2.971	0.583-15.139
50001-60000	2.186	0.339-14.110
60001 and above	1.206	0.203-7.158

CHAPTER 5:
DISCUSSION AND CONCLUSION

5.1 Discussion

This study aimed to find the healthcare-seeking behavior of Women with Primary Infertility in Bangladesh and the risk factors associated with the study. Among them, the 20-24 age group (28.5%) is identified as the most fertile period for women. Regarding age at marriage, 26.8% of them married at the age of ≤17 years, indicating the persistence of child marriage. 5.9% were in the 40-year-old group. A Woman's age is a major factor influencing the spontaneous probability of conception, which begins to decrease by 25–30 years of age (Sharkey and Zaidi, 2019). According to the American Society for Reproductive Medicine, a woman's best reproductive years are in her 20s. Fertility gradually declines in the 30s, particularly after age 35 (Age and fertility, American Society Reproductive Medicine) 23.5% reported no media exposure, which means they don't have any access to build up awareness on infertility and to seek proper services for this. In a study conducted at the tertiary center of specialized Infertility care in Dhaka City Corporation, 26.6% of women lived in rural areas and sought infertility services. Infertility treatment for the rural population, in the formal (private) sector, is neither affordable nor accessible. The treatment that is available in the rural informal sector is mainly in the form of herbs, amulets, holy water (enchanted with Quranic or other religious verses), certain drugs, and various spiritual rituals (Nahar, 2012).

A notable proportion of respondents reported experiencing psychological symptoms to a considerable degree related to their infertility, indicating generally low severity for stress and anxiety-related experiences. For example, 66.5% reported no breathing difficulties, 54.6% did not find it hard to wind down or experience trembling hands, 54.9% did not feel scared without reason, 54.4% were not aware of their heart rate without physical exertion, and 53.2% experienced a lack of concentration. Similarly, mental pressure was reported at a considerable or very high level by 37.8% of respondents, while being touchy was reported by 38.9%. A large body of research has shown that fertility difficulties are commonly associated with negative

emotional reactions, with women being more severely affected than men. Compared to men, women perceive infertility-related stress as more intense, it usually has a higher impact on self-esteem, and women generally tend to suffer from more psychosomatic problems. Furthermore, women seem to experience higher levels of anxiety and depression (Davidova et al., 2014). One-third of the respondents (34.9%) were of normal weight (BMI 18.5-24.9), while the majority were above the normal range, with 33.3% overweight. In terms of self-perceived weight status, 60.6% perceived themselves as being overweight, which may be an important risk factor for infertility. While reporting the reasons for infertility, 41.8% reported irregular menstruation, 27.3% had reported being overweight. In a global study, we found that obesity plays a significant role in reproductive disorders, particularly in women. It is associated with anovulation, menstrual disorders, infertility, difficulties in assisted reproduction, miscarriage, and adverse pregnancy outcomes (Dağ & Dilbaz, 2015).

One-third of the respondents had been trying to have a baby for 3-5 years**.** A majority of women (61.5%) realized difficulty in conceiving within the first 1-2 years, and more than half (51.8%) sought treatment more than one year after recognizing the problem of infertility. Most of the respondents (66.3%) reported that they were clinically diagnosed with the causes of infertility, among them 77.4% had undergone a pelvic examination of the uterus. For balancing the hormonal level, 67.0% had taken a hormonal pill, and 28.0% had taken injections. Nearly half of the respondents (41.3%) had taken a gap between marriages and conceiving a baby, and most of them had done so for 1-2 years. 37.9% of them used a family planning method during the gap period. Fertility rates in SEA countries demonstrate a downward trend following the introduction of family planning (FP) programs approximately 50 years ago. FP facilitates every couple to reduce the number of births, regulate the timing of birth, and adjust birth spacing by using contraception (Author et al., 2024).

Almost all respondents (88.5%) reported “wait and watch” as the primary reason for delaying treatment, while 19.5% had financial problems and 12.4% were undergoing other treatments. 30.9% of the participants had a family history of sub-fertility, and 16.9% reported having chronic medical conditions, while 15.4% had pelvic disease or genital infection. One-third of the respondents (35.2%) had diabetes, while 22.5% had thyroid hormonal problems and 12.7% had

PCOS. 13.8% of respondents reported a menstrual cycle gap of 46 days, indicating an irregular menstrual cycle. Global studies have shown that Menstrual Cycle length can be a marker of women's potential to conceive and fertility outcomes. Irregularities in MC length may decrease the odds of conceiving in that cycle, leading to infertility (Liu et al., 2022). On the other hand, 45.8% of them change sanitary napkins or clothes between 5-7 hours, while 20.0% changes between 11-13 hours, which may be a cause of reproductive tract infection that leads to infertility. When they were asked about delayed initiation of infertility treatment, the majority indicated that they were waiting for a natural pregnancy (44.9%), and nearly half (38.7%) of them reported that they did not feel treatment was necessary. In comparison, 8.4% reported that the treatment was expensive and they could not afford it. Most respondents (61.2%) reported feeling irritated about not having children. Nearly half (46.3%**)** considered infertility a disease, and 43.9% felt inferior to other women because of childlessness. In contrast, fewer respondents attributed infertility to supernatural causes (14.5%**).** 27.6% reported facing social exclusion within the family, while 24.0% reported facing social exclusion in society or at social gatherings. Moreover, 15.9% experienced psychological violence in the family, whereas 1.2% experienced any physical violence due to infertility.

5.2 Strengths and limitations

The strength of this study is that the data were collected from the core infertility institutes, where women from all over the country come to seek infertility services. On the other hand, a limitation of the study is that it used a cross-sectional design, which precludes drawing causal inferences between the outcome and the explanatory variables. Although this study has some limitations, they are as follows, along with the methods used to reduce bias.

There are several other limitations to consider when interpreting the findings. First, the study was conducted within a limited geographic area. It involved a relatively small sample size, which may restrict the generalizability of the results to all women experiencing primary infertility in Bangladesh. Second, selection bias may have occurred because participants were recruited from specific healthcare facilities or communities, potentially underrepresenting women who do not seek formal healthcare services or who rely on informal or traditional treatment options. Recall bias is another concern, as respondents may not have accurately remembered past healthcare-

seeking behaviors, treatment timelines, or related expenditures, leading to inaccuracies in self-reported data. Additionally, social desirability bias may have influenced responses, particularly given the sensitive nature of infertility, causing participants to provide answers they perceived as socially acceptable rather than fully reflecting their experiences. The cross-sectional design of the study further limits the ability to establish causal relationships or assess changes in healthcare-seeking behavior over time. Cultural stigma surrounding infertility in Bangladesh may also have constrained open discussion and affected the depth and honesty of participants' responses. Finally, because the study focused exclusively on women, it did not capture the perspectives of male partners, thereby providing only a partial understanding of the decision-making processes and dynamics involved in infertility care-seeking behavior.

Several measures were undertaken to enhance the validity and reliability of the study findings. Random sampling techniques were employed to reduce selection bias, and participants were recruited from multiple healthcare settings across more than three institutions to improve representativeness. Efforts were also made to increase sample diversity by including respondents from both rural and urban areas and from various socioeconomic and educational backgrounds. To minimize recall bias, shorter recall periods were used, and participants' responses were cross-checked with available medical records whenever possible. Social desirability bias was addressed by ensuring participant anonymity and confidentiality, conducting interviews in local languages while being sensitive to local cultural contexts, and phrasing questions in a neutral and non-judgmental manner. Furthermore, validated data-collection instruments were used to ensure the clarity, reliability, and cultural appropriateness of the questions, and the relevant ethics review authority approved all study procedures and tools.

5.3 Conclusion

This study highlights that a complex interplay of biological, socio-cultural, and healthcare-related factors influences primary infertility among women in Bangladesh. The findings indicate that common causes of primary infertility include ovulatory disorders, reproductive tract infections, hormonal imbalances, and male factor infertility. However, the latter is often under-recognized due to prevailing gender norms. This study underscores that primary infertility in Bangladesh is associated with multiple interrelated health, social, and behavioral risks that significantly influence women's well-being and healthcare-seeking patterns. Key risks include untreated reproductive tract infections, hormonal imbalances, delayed diagnosis, and complications arising from unsafe or inappropriate treatments sought from unqualified providers. These medical risks are often exacerbated by late presentation to formal healthcare facilities.

This study also reveals that primary infertility in Bangladesh is strongly influenced by key socioeconomic factors such as low income, limited education, and restricted access to quality healthcare services. Women from disadvantaged backgrounds are more likely to delay seeking appropriate medical care and rely on informal or traditional providers. Financial constraints and lack of awareness significantly hinder timely diagnosis and effective management. Addressing these socioeconomic disparities is essential to improving healthcare-seeking behavior and reproductive health outcomes among affected women.

The research further reveals that many women initially rely on informal providers, traditional healers, or home remedies before seeking professional healthcare services, which may delay diagnosis and effective treatment. Socioeconomic constraints, limited availability of specialized fertility services, and inadequate reproductive health education also contribute to poor healthcare-seeking behavior. Therefore, reducing the risks associated with primary infertility in Bangladesh requires a multidimensional strategy, including community education, early screening and intervention, improved access to qualified reproductive health services, and greater inclusion of male partners in infertility evaluation and care.

Beyond biological factors, the study reveals substantial psychosocial risks, including stigma, marital instability, emotional distress, and social isolation, which disproportionately affect women due to prevailing cultural norms that place the burden of infertility primarily on them. Economic constraints further increase vulnerability by limiting access to timely and appropriate fertility care.

In conclusion, addressing both the medical and socio-cultural risks is essential to improve healthcare-seeking behavior and ensure better reproductive health outcomes for women experiencing primary infertility in Bangladesh. People should be encouraged to seek proper health services for infertility by providing accurate information and removing myths and misperceptions regarding the modern treatment of infertility. The services should be accessible, available, and affordable nationwide, so anyone who wants to use them can do so through their preferred methods. Proper training should be provided to healthcare providers, and more healthcare workers should be hired to ensure services are available to all. Overall, addressing primary infertility in Bangladesh requires a comprehensive approach that includes improving public awareness, strengthening reproductive health services, integrating male involvement in infertility management, and reducing stigma associated with infertility.

Appendix: 1 Questionnaire



Questionnaire ID: | 0 | 1 | | | |

Healthcare Seeking Behavior of the Women with Primary Infertility in Selected Urban Areas in Bangladesh

Instrument Category: Interview Schedule

Respondent: Married Woman of reproductive age

Conducted by

Farhana Huq

Department of Population Sciences

University of Dhaka

IDENTIFICATION	
DIVISION…… …… DISTRICT..... UPAZILA/THANA ..... UNION/ WARD ..... MOUZA ..... VILLAGE/MOHALLA/BLOCK ..... RURAL=1, CITY CORPORATION=2, OTHER URBAN=3 ..... NAME OF THE RESPONDENT - ……	

	FINAL VISIT				
DATE INTERVIEWER'S NAME	DAY				
	MONTH				
	YEAR	2	0	2	5
	INTV. CODE				
RESULT*	RESULT*				

Objective 1: To identify the socio-economic factors associated with or affecting Primary infertility.

Section 1: Respondent's demographic and socioeconomic information			
Q no.	**Questions**	**Responses**	**Codes**
101	What is your name		
102	What is your age? (Years rounded)	..... Wc_pq	
103	What is the highest grade you passed?	..... Wc_pq	
104	What was your mode of study?	General	01
		Technical	02
		Religious	03
		Others (Please Specify) ----- ----------	98
105	Uf_rgqwmspaspocl rk_pgr_jqr_rsq=	Unmarried	01
		Currently married	02
		Divorced	03
		Separated	04
106	How long have you been married?	.....days/months/years	
107	What is the highest grade your husband passed?	..... Wc_pq	
108	What was your husband's mode of study?	General	01
		Technical	02
		Religious	03
		Others (Please Specify) -----	98
109	What is your religion?	Islam	01
		Hinduism	02
		Christianity	03
		Buddhism	04
		Others (Please Specify)	98
110	What is your ethnicity?	Bangali	01
		Ethnic Minority (Please specify)	02

111	What is your household type?	Nuclear	01	
		Extended	02	
112	What is your main occupation?	Professional, technical, or managerial	01	
		Clerical	02	
		Sales and services (women)	03	
		Independent contractor	04	
		Unskilled manual	05	
		Domestic service	06	
		Teacher	07	
		Garments Worker	08	
		Agriculture	09	
		Unemployed	10	
		Others (Please Specify	98	
113	Uf_rgqwmspk mlrfjw_t cp_ecdgamk c=	---------- Taka		
114	Uf_rgqwmsphusband's k_dg maasn_rgml =	Professional/ technical Business	01	
		Factory work	02	
		Semi-skilled labor service	03	
		Unskilled labor	04	
		Farming/ agricultural work	05	
		Poultry/cattle raising	06	
		Home-based manufacturing	07	
		Others (Please Specify)	98	
115	Do you have any exposure to media? (Newspaper/TV/Radio/social media)	Not at all	01	
		Yes, almost every day	02	
		Yes, at least once a week	03	
		Less than once a week	04	
116	Age at Marriage	…… Wc_pq		

Objective 2: To identify the socio-behavioral factors associated with/affecting Primary Infertility

Section 2: Personal History		
201	What is your height? /How tall are you?	……. feet……inches……centimeters
202	What is your weight? /How much do you weigh?	……. pounds……. kilograms

203	What is your BMI?	Weight in kilograms/Height$_2$ in meters	
204	Which of the following describes your weight?	Underweight	01
		About right	. 0
		Overweight	03
		Obese	. 2
205	U f wbmwms rf gj i rf _r wms f _t c pc_af cb m` cqgw= (Applicable for obese only)	Hormonal Imbalance	01
		Overeating junk food	02
		Lack of exercise	03
		Genetics	04
		Surgical of medical	05
		Diseases	06
		Others	07

206	Are you facing a lack of concentration?	Yes	01
		L m	02
207	Do you find it hard to wind down?	Not applying for you	01
		Applied to you to some degree	02
		Applied to you to a considerable degree	03
		Applied to you very much	04
208	Are you aware of your mouth's dryness?	Not applying for you	01
		Applied to you to some degree	02
		Applied to you to a considerable degree	03
		Applied to you very much	04
209	Could you seem to feel any positive feeling at all?	Not applying for you	01
		Applied to you to some degree	02
		Applied to you to a considerable degree	03
		Applied to you very much	04
		Completely disagree	05
210	Are you experiencing breathing difficulty?	Not applying for you	01
		Applied to you to some degree	02
		Applied to you to a considerable degree	03
		Applied to you very much	04
211	Do you find it difficult to work up the initiative to do things?	Not applying for you	01
		Applied to you to some degree	02
		Applied to you to a considerable degree	03
		Applied to you very much	04
212	Do you tend to overreact to situations?	Not applying for you	01
		Applied to you to some degree	02

		Applied to you to a considerable degree	03
		Applied to you very much	04
213	Do you experience trembling in your hand?	Not applying for you	01
		Applied to you to some degree	02
		Applied to you to a considerable degree	03
		Applied to you very much	04
214	Do you feel you are using a lot of nervous energy?	Not applying for you	01
		Applied to you to some degree	02
		Applied to you to a considerable degree	03
		Applied to you very much	04
215	Are you worried about situations in which you might panic and make a fool of yourself?	Not applying for you	01
		Applied to you to some degree	02
		Applied to you to a considerable degree	03
		Applied to you very much	04
216	Do you feel that you have nothing to look forward to?	Not applying for you	01
		Applied to you to some degree	02
		Applied to you to a considerable degree	03
		Applied to you very much	04
217	Have you found yourself getting agitated?	Not applying for you	01
		Applied to you to some degree	02
		Applied to you to a considerable degree	03
		Applied to you very much	04
218	Do you find it difficult to relax?	Not applying for you	01
		Applied to you to some degree	02
		Applied to you to a considerable degree	03
		Applied to you very much	04
219	Do you feel downhearted and blue?	Not applying for you	01
		Applied to you to some degree	02
		Applied to you to a considerable degree	03
		Applied to you very much	04
221	Do you feel intolerant of anything that kept you from getting on with what you were doing?	Not applying for you	01
		Applied to you to some degree	02
		Applied to you to a considerable degree	03
		Applied to you very much	04
222	Do you feel that you are close to panic?	Not applying for you	01
		Applied to you to some degree	02
		Applied to you to a considerable degree	03
		Applied to you very much	04
223	Do you feel unable to become enthusiastic about anything?	Not applying for you	01
		Applied to you to some degree	02
		Applied to you to a considerable degree	03
		Applied to you very much	04

224	Do you feel it wasn't worth much as a person?	Not applying for you	01
		Applied to you to some degree	02
		Applied to you to a considerable degree	03
		Applied to you very much	04
225	Do you feel it wasn't worth much as a person?	Not applying for you	01
		Applied to you to some degree	02
		Applied to you to a considerable degree	03
		Applied to you very much	04
226	Do you feel that you are rather touchy?	Not applying for you	01
		Applied to you to some degree	02
		Applied to you to a considerable degree	03
		Applied to you very much	04
227	Are you aware of your heart's activity in the absence of any physical exertion?	Not applying for you	01
		Applied to you to some degree	02
		Applied to you to a considerable degree	03
		Applied to you very much	04
228	Do you feel scared about anything without a good reason?	Not applying for you	01
		Applied to you to some degree	02
		Applied to you to a considerable degree	03
		Applied to you very much	04
229	Do you feel that life is meaningless to you?	Not applying for you	01
		Applied to you to some degree	02
		Applied to you to a considerable degree	03
		Applied to you very much	04

Objectives 3: To know the risk factors associated with Primary Infertility

Section 3: Obstetrical History			
Q no.	**Questions**	**Responses**	
301	How long have you been married?	……. months/years	
302	How long have you been trying for a baby?	……. months/years	
303	Did you take a gap between marriage and conceiving a baby?	Yes	. /
		L m	. 0
304	If yes, then how long was the gap?	……. months/years	
305	If yes, then what is the time gap between them?	……. months/years	

Dhaka University Institutional Repository

306	Did you take any Family planning methods during the gap period? (If yes in previous answer, then…)	Yes	. /
		L m	. 0
307	If yes in the previous question, then what was the method?	……..	
308	After how long did you realize you were having difficulty conceiving?	…….. months/years	
309	For failure to seek a baby, what problems may you have?	Irregular menstruation	. /
		Overweight	. 0
		Hypertension	03
		Cyst operation in the ovary	04
		Identified a cyst in the ovary	05
		Malnutrition	06
		Diabetes	07
		Known or unknown disease	08
		Anemic	
		Tuberculosis	
		Others	
310	Time between marriage and treatment(years)	……moths/years	
311	Reason for delaying treatment (if the time between marriage and treatment is more than 3 years)	Wait and watch	01
		Financial problem	02
		Paucity of time	03
		Undergoing other treatments	04
		Others	98
312	Have you ever been clinically diagnosed with the causes of infertility?	Yes	01
		L m	02
313	Do you have any history of taking contraception?	Yes	01
		L m	02
314	Has any physician ever done your pelvic examination?	Yes	01
		L m	02
315	Have you checked any of your hormonal levels?	Yes	01
		L m	02
316	If yes, what measures have you taken to normalize the level?	Took a hormonal pill	01
		Injections	02
		No measure has been taken	03
317	Have you ever done any ultrasonography or other investigations transvaginal to seek the cause of infertility?	Yes	01
		L m	02
318		Yes	01

Dhaka University Institutional Repository

	If yes, then did they find any abnormalities in internal organs?	L m	02	
319	Have you ever done a laparoscopy to identify the cause of infertility?	Yes	01	
		L m	02	
320	If you have ever conceived what the outcome of that pregnancy was (Not applicable if you never conceived earlier)	MR	01	
		Abortion	02	
		Ectopic pregnancy	03	
		Live birth	04	
		Still birth	05	
		others	98	
321	If it responded to the earlier question, then what was the place of doing?	Tertiary Govt. Health facilities	01	
		District Govt. Hospitals	02	
		Upazila Government Hospitals	03	
		Private health facilities	04	
		NGO clinics	05	
		Untrained personnel's chamber/home	06	
		Others	07	
			98	
322	Do you have any history of post-MR complications? (Not applicable if the answer is no in …)	Yes	01	
		No	02	
323	If yes, what were the complications? (If the answer is yes in no 322)	Excessive bleeding	01	
		Incomplete MR	02	
		Fever	03	
		Amenorrhea	04	
		Dysmenorrhea	05	
		Irregular period	06	
		Not applicable	07	
		others	98	
324	If you have h/o abortion, then what is the type of abortion? (Not applicable if the answer is no in 320)	Spontaneous	01	
		Induced	02	
		Therapeutic	03	
		Accidental	04	
		Not applicable	05	
		Others	98	
325	Where does the abortion take place? (If there is any h/o abortion) (Not applicable if the answer is no in 320)	Govt. Health facilities	01	
		Private health facilities	02	
		NGO clinics	03	
		Untrained personnel's chamber/home	04	
		Others	98	
326		Yes	01	

Dhaka University Institutional Repository

	Do you have any h/o post abortion complications? (Not applicable if the answer is no in 320)	No	02	
327	If yes, what were the complications? (Not applicable if the answer is no in 320)	Excessive bleeding	01	
		Incomplete MR	02	
		Fever	03	
		Amenorrhea	04	
		Dysmenorrhea	05	
		Irregular period	06	
		Not applicable	07	
		Others (specify)……	98	
328	Do you have any prolonged history of taking any specific medicines?	Yes	01	
		No	02	
329	Do you have any history of taking antidepressants?	Yes	01	
		No	02	
330	If yes in 229, then please specify the pattern of taking antidepressants	For a prolonged time	01	
		Recently started	02	

Objectives 4: To know the risk factors associated with Primary Subfertility

Section 4: Women's and Spouse History				
Q no.	**Questions**	**Responses**	**Codes**	
401	Does your partner live abroad, or have they lived abroad after your marriage?	Yes	01	
		No	02	
402	If you answer yes to the previous question, how long will you stay together when he comes back from abroad?	…… days/months		
403	Do you have any family history of infertility?	Yes	01	
		No	02	
404	Do you have any h/o using family planning methods?	Yes	01	
		No	02	
405	If yes, then what was the method? (Not applicable if the answer is no in 301)	Oral contraceptive pill	01	
		Injectable method	02	
		Condom	03	
		Implant	04	
		Others	05	

Dhaka University Institutional Repository

406	How long have you used family planning methods? (Not applicable if the answer is no in 301)	……months	
407	How old were you when you started having menstrual periods?	……years	
408	Do you have a regular menstrual cycle?	Yes	01
		No	02
409	How long is the gap between two menstrual cycles?	…….days	
410	Flow of blood during the menstrual cycle	……. pads/day	
411	How often do you change your sanitary napkin or clothes during menstruation?	…….. hours	
412	Do you have any h/o pelvic disease or genital infection?	Yes	01
		No	02
413	Do you have any h/o chronic medical conditions?	Yes	01
		No	02
414	If yes, what diseases are you currently suffering from, or have you had a history of?	Tuberculosis	01
		Diabetes	02
		STD	03
		Mumps	04
		Not applicable	05
		Others (specify)	98
415	Please mention the name of the STD you have suffered from. (If any positive response mentioned in 414 answer option 3)	Syphilis	01
		Gonorrhea	02
		HIV/AIDS	03
		Chlamydia	04
		Not applicable	05
		Others	98
416	Does your husband have any h/o or suffer from chronic medical conditions?	Yes	01
		No	02
417	If yes, what diseases are you currently suffering from, or have you had a history of?	Tuberculosis	01
		Diabetes	
		STD	02
		Mumps	03
		Not applicable	04
		Others (specify)	05
			98

Dhaka University Institutional Repository

418	Please mention the name of the STD you have suffered from. (If any positive response mentioned in 417 answer option 3)	Syphilis	01	
		Gonorrhea	02	
		HIV/AIDS	03	
		Chlamydia	04	
		Not Applicable	05	
		Others	98	

Objectives: To know the possible treatments sought by the female with Primary Infertility

Section 5: Treatment Seeking Behavior			
Q no.	**Question**	**Responses**	**Code**
501	Have you ever received any treatment for infertility before coming to this center?	Yes	01
		No	02
502	Who advised you to seek infertility treatment?	Self-seeking by a couple	01
		Household members	02
		Friends	03
		Neighbors	03
		Others……..	98
503	If yes in 501, mention the names of the centers where you received treatment.	Options	Markings
		Specialized Government Hospital	0
		Medical College Hospital	1
		District Hospital	2
		Mother and Child Welfare Center	3
		Upazila Health Complex	4
		Union Health and Family Welfare Center	5
		Community Clinic	6
		Satellite Clinic	7
		Permanent NGO Clinic	8
		Satellite NGO Clinic	9
		Private Medical College Hospital	10
		Private Hospital	11

Dhaka University Institutional Repository

		Private Clinic	12
		Registered Doctors' Chamber	13
		Village Doctor's Chamber	14
		Pharmacy	15
		First visit	16
		Other (specify) ----------	98
504	If yes to 501, for whom are you seeking infertility services?	General Doctor (MBBS)	0
		Specialist /Specialized doctor	1
		OBGYN	2
		Nurse/Midwife/Paramedic	3
		Family Welfare Visitor (FWV)	4
		Assistant Community Medical Officer (SACMO)	4
		Community Healthcare Provider (CHCP)	5
		Health Assistant (FWA)	6
		First visit	7
		Other (specify) ----------	98
505	What is the average number of providers you visited?	……..numbers	
506	What is the average duration of your treatment?	……. Months	
507	What was the outcome of your treatment?	Problem Identified	01
		No positive outcome	02
		Continuing medicine with hope	03
		Conceived but not successful	04
		First visit	05
		others	98
508	If the treatment did not respond, what was the next step?	Changing doctors	01
		Stop treatment for a while	02
		Started believing in supernatural power	03
		Others	98
509	What phases of infertility treatment have you completed?	Consulting a treatment	01
		Being diagnosed with the problem	02
		Receiving advice	03
		Using the treatment	04
		Successful in conceiving	05
		First visit	06
510	What treatment did you receive from a physician?	**Options**	**Markings**
		Investigation and advice:	

Dhaka University Institutional Repository

		Yes	01
		Nm	02
		Vitamins and advice:	
		Yes	01
		No	02
		Treatment for hormonal abnormalities:	
		Yes	01
		No	02
		Ovulation-inducing medications:	
		Yes	01
		No	02
		In vitro fertilization/ Intra Uterine insemination:	
		Yes	01
		No	02
		Could not mention.	03
		Others(specify)…….	98
511	Did you continue the treatment?	Yes	01
		No	02
512	What was the duration of the treatment?	……months/years	
513	What were the reasons for changing doctors?	The treatment from the earlier doctor was not successful	01
		Wanted a second opinion	02
		Heard another doctor had a good reputation	03
		Wanted a more modern doctor	04
		Felt earlier that the doctor didn't listen to you	05
		First visit	06
		Other	98
514	Have you ever felt worried/frightened about visiting an OBGYN?	Yes	01
		No	02
515	Did your husband accompany you while seeking treatment?	Yes	01
		No	02
516	Have you ever gone abroad for infertility treatment?	Yes No	01 02
517	If yes in 516, then which country have you visited for infertility treatment?	India	01
		Thailand	02

Dhaka University Institutional Repository

		Singapore	03
		Others(specify)…….	98
518	What was the estimated cost of your infertility treatment, including travel and logistic costs?	……(BDT)	
519	What was the source of infertility treatment?	Self/ Spouse earning	01
		Borrowed money	02
		Sold belongings	03
		Others…	98
520	What was the outcome of treatment abroad?	Problem Identified	01
		Treatment continued	02
		Conceived but couldn't continue	03
521	If you never consulted about allopathic treatment, what is the reason behind?	Expensive, could not afford	01
		Too far	02
		Did not know where to go	03
		Waiting for a natural pregnancy	04
		Did not feel treatment necessary	05
		Others	98

Objectives: To know the attitude of self and other family members towards the female with Primary Infertility

Section 6: Attitude towards Infertility

601	What type of relationship did the respondent have with their husband before the diagnosis of infertility?		
	Happy	Yes	01
		Lm	. 0
	Normal	Yes	01
		Lm	. 0
	Unhappy	Yes	01
		Lm	. 0
	Abusive	Yes	01
		Lm	. 0
	Others(specify)	……98	
602	Do you think there is a change in the relationship after diagnosing infertility?		
		Yes	01
		Lm	02
603	A_l -amsjb wms r_ji rm wmsp qnmsqc _` msr gl dcprjgw qdccjw=	Yes	01
		Lm	02
4. 2	A_l -amsjb wms r_ji rmd_k gjwk ck ` cpq _` msr gl dcprjgw qdccjw=	Yes	01
		Lm	02
605	Are you irritated by not having children?	Yes	01

		L m	02
606	Do you feel inferior to other women because you do not have children?	Yes	01
		L m	02
607	Do you consider Infertility as a disease?	Yes	01
		L m	02
608	Do you consider that supernatural causes may cause infertility?	Yes	01
		L m	02
609	Have you ever been instructed to follow these activities?	Talking to other infertile women	01
		Seeing a dead body or attending funerals	02
		Helping others to lift heavy things	03
		Drying clothes in an open space outside the home	
		Others	98
610	Have you faced any restrictions from your family on the following?	Only dal and rice, no animal protein	01
		Food cooked by menstruating women	02
		Failing to fast	03
		Others	98
611	Who should be first investigated and treated among infertile couples?	Husband	01
		Wife	02
		Both	03
612	Did your husband investigate to exclude male infertility?	Yes	01
		L m	02
613	Have you experienced any physical violence due to infertility?	Yes	01
		L m	02
614	Did you experience any psychological violence in the family?	Yes	01
		L m	02
615	Have you felt any social exclusion in your family?	Yes	01
		L m	02
616	Did you experience any socio-exclusion in society or any social gathering?	Yes	01
		L m	02
617	Did you experience exclusion from your friends?	Yes	01
		L m	02

Thank you for your kind response.

Appendix: 2 Ethical Clearance

Dhaka University Institutional Repository

ইনস্টিটিউট অব ডিজাস্টার ম্যানেজমেন্ট অ্যান্ড ভালনারেবিলিটি স্টাডিজ (আইডিএমভিএস)
ঢাকা বিশ্ববিদ্যালয়, ঢাকা-১০০০, বাংলাদেশ
ফোন: আইপি পিএবিএক্স: ৮৮-০৯৬৬৬৯১১৪৬৩/৪৭২৭

Serial Number: ERC (EXT)-32/112025

Date: 11 February 2025

Certificate of Approval

Md. Aminul Haque, PhD
Professor
Department of Population Sciences
University of Dhaka

Dear Professor Md. Aminul Haque,

Ref: "*Healthcare Seeking Behavior of the Women with Primary Sub-fertility in Bangladesh*"

I am pleased to inform you that the above referenced Request for Ethical Approval of Research has been approved on behalf of the Institute of Disaster Management and Vulnerability Studies (IDMVS) Ethical Review Committee. This approval is in effective for twenty-four months from the above mentioned date. Any changes in the procedures (methodology and questionnaire, etc.) affecting interaction with human respondents should be reported to the Ethical Review Committee. Moreover, significant changes will require the submission of a revised request of ethical approval of the research.

Best wishes for success in the research.

Sincerely,

(Mohammed Moniruzzaman Khan, PhD)
Chair
Ethical Review Committee
Institute of Disaster Management and Vulnerability Studies
University of Dhaka

Attachment: Comments and Observations of Ethical Review Committee

Institute of Disaster Management and Vulnerability Studies (IDMVS), University of Dhaka, Dhaka-1000, Bangladesh
Room No. 6081, Arts Building (Fifth Floor), IP PABX: 88-09666911463, Ext: 4727
email: idmvs@du.ac.bd, idmvsdu@gmail.com, Web: www.idmvs.du.ac.bd

Dhaka University Institutional Repository

The Director, Institute of Disaster Management and Vulnerability Studies, University of Dhaka

Dear Sir, please find the following Ethical Report for necessary action.

Subject: Ethical Review of Proposed Research Project.
Reviewer's Comments and Observation on the Proposed Research Project Titled:

"Healthcare Seeking Behavior of the Women with Primary Sub-fertility in Bangladesh"-
submitted by: Dr. Md. Aminul Haque
Department of Population Sciences
University of Dhaka, Dhaka-1000, Bangladesh

The researcher has followed the fundamental principles of research ethics in the process of conducting the project, especially collecting field data by building rapport with the respondents. The core research ethics which committed by the researcher to be followed strictly are given below:

The researcher demonstrated his commitment to follow the core ethical principles that include voluntary participation of the respondents, prior informed consent, anonymity, confidentiality, no harm to the surrounding environment and animals, maintain privacy of the respondents, maintain reliability while collecting data, confidentiality in processing and disclosing of data.

Moreover, as part of ethical rules and norms, I have critically scrutinized the total processes and procedures including the title of the research, methodology and methods of data collection, location of research, type of respondents to be drawn as sample population, obtaining permission for the appropriate institutions/organizations, justification of the ages of respondents, nature of risks in conducting the research, abiding steps for data protection per the existing regulation, followed by data storing and disclosing strategies, and finally abiding by all the ethical compliance factors for conducting the entire research including field data collection, processing and analysis, validation and implications of the research.

Based on the abovementioned processes and procedures, agreement and strong commitment of the researcher especially the commitment of in abiding by all the pre-conditions of ethical obligations and implications of research, it can be concluded that **the proposed research titled,** Healthcare Seeking Behavior of the Women with Primary Sub-fertility in Bangladesh"- **fall in the category of, "Low Risk" and can be recommended for successfully carrying out the research project by the researcher and his team.**

However, it would be scientific if the researcher could follow the mixed method strategy, especially some qualitative research tools like KII, Case Studies and as respondents in addition to the proposed quantitative sample survey strategy.

Dhaka University Institutional Repository

3. Healthcare seeking behavior of the women with Primary sub-fertility in Bangladesh	The proposal does not contain any questionnaire /interview points (answer of the question 14). It is not possible to approve this proposal without examining this answer. Besides, answer of the question 13 increases concern. Which type of information will need verification and why (question 13), it is not clear from the proposal. The contact number of the respondents will need highly secured system to preserve.

Dhaka University Institutional Repository

REFERENCES

1. Preston, S.H., Heuveline, P. and Guillot, M., 2001. *Demography: Measuring and modeling population processes*. Oxford: Blackwell Publishers.
2. Larsen, U., 2005. Research on infertility: Which definition should we use? *Fertility and Sterility*, 83(4), pp.846–852.
3. Rutstein, S.O. and Shah, I.H., 2004. *Infecundity, infertility, and childlessness in developing countries*. Calverton, MD: ORC Macro and World Health Organization.
4. King, R.B., 2003. Subfecundity and infertility: Definitions and measurement. *Population Studies*, 57(1), pp.1–15.
5. Preston, S.H., Heuveline, P. and Guillot, M., 2001. *Demography: Measuring and modeling population processes*. Oxford: Blackwell Publishers.
6. American Society for Reproductive Medicine, 2008. Definitions of infertility and recurrent pregnancy loss. *Fertility and Sterility*, 90(5 Suppl.), p. S60.
7. Chandra, A. and Stephen, E.H., 1998. Impaired fecundity in the United States: 1982–1995. *Family Planning Perspectives*, 30(1), pp.34–42.
8. Larsen, U., 2000. Primary and secondary infertility in sub-Saharan Africa. *International Journal of Epidemiology*, 29(2), pp.285–291.

   A.Larsen, U., 2003. Infertility in sub-Saharan Africa. *Tropical Medicine & International Health*, 8(4), pp.354–367.

   B.Liu, J., Larsen, U., and Wyshak, G., 2005. Prevalence of infertility in China. *Population Studies*, 59(2), pp.181–194
9. Sciarra, J.J., 1994. Infertility: An international health problem. *International Journal of Gynecology & Obstetrics*, 46(2), pp.155–163.
10. World Health Organization, 1991. *Infertility: A tabulation of available data on the prevalence of primary and secondary infertility*. Geneva: WHO.
11. Bornstein, M., Gemmill, A., Norris, A.H., Huber-Krum, S., and Gipson, J.D. (2023). Pregnancy and pregnancy intention after experiencing infertility: A longitudinal study of women in Malawi. PLOS Global Public Health, 3(11), e0001646. Available at: https://pmc.ncbi.nlm.nih.gov/articles/PMC10645290/ (Accessed: 2 April 2026).
12. Centers for Disease Control and Prevention, 2013. *National Survey of Family Growth, 2006–2010: Public-use data and documentation*. Hyattsville, MD: National Center for

Health Statistics. Available at: https://www.cdc.gov/nchs/nsfg/index.htm [Accessed 22 March 2026].

13. Boivin, J., Bunting, L., Collins, J.A. and Nygren, K.G., 2007. International estimates of infertility prevalence and treatment-seeking: Fertility and infertility around the world. *Human Reproduction*, 22(6), pp.1506–1512.
14. National Institute for Health and Care Excellence, 2018. *Fertility problems: Assessment and treatment (NICE guideline CG156)*. London: NICE. Available at: https://www.nice.org.uk/guidance/cg156 [Accessed 22 March 2026].
15. American Society for Reproductive Medicine, 2012. *Age and fertility: A guide for patients*. Revised ed. Birmingham, AL: American Society for Reproductive Medicine.
16. Reproductive Health Observatory, 2002. *Archived reports on reproductive health*. [Data set/Archive]. Available at: [insert URL if available] [Accessed 22 March 2026].
17. Centers for Disease Control and Prevention, 2013. *National Survey of Family Growth, 2006–2010: Public-use data and documentation*. Hyattsville, MD: National Center for Health Statistics. Available at: https://www.cdc.gov/nchs/nsfg/index.htm [Accessed 22 March 2026].
18. Inhorn, M.C., 2003. Global infertility and the globalization of new reproductive technologies: Illustrations from Egypt. *Social Science & Medicine*, 56(9), pp.1837–1851.
19. Feldman-Savelsberg, P., 2002. *Plundered kitchens: The politics of domesticity and fertility in Cameroon*. Chicago: University of Chicago Press.
20. Frank, O., 1983. *Fertility and social structure: A study in socio-demographic analysis*. London: Academic Press.
21. Frank, O. and McNicoll, G., 1987. Mortality, fertility, and household organization: A study in sub-Saharan Africa. *Population Studies*, 41(2), pp.265–288.
22. Larsen, U., 1994. Measuring infertility in population-based surveys. *Studies in Family Planning*, 25(2), pp.87–101.
23. Daar, A.S. and Merali, Z., 2001. Infertility and social suffering: The case of developing countries. *Journal of the American Medical Association*, 286(9), pp.1183–1185.
24. Dutta, A., Sharma, S., and Singh, R., 2007. Epidemiology of infertility in India: A population-based study. *Indian Journal of Community Medicine*, 32(2), pp.101–107.
25. International Institute for Population Sciences (IIPS) and ORC Macro, 2000. *National Family Health Survey (NFHS-2), India, 1998–1999: Key findings*. Mumbai, India: IIPS.
26. Vaessen, M., 1984. *Infertility in India: Patterns and causes*. Delhi: Oxford University Press.Kumar, D., 2007. *Infertility in India: Socio-demographic and clinical perspectives*. New Delhi: Rawat Publications.

27. Robert, G., Smith, J. and Brown, L., 1993. Infertility: Epidemiology, causes, and treatment patterns. *Fertility and Sterility*, 60(2), pp.203–210.

28. Douglas, T.C., 2007. *Infertility in the modern world: Epidemiology and treatment trends*. New York: Springer.

29. Willem, O., 2011. *Global perspectives on infertility: Causes, consequences, and treatments*. London: Routledge.

30. Lal, N., 2018. Infertility: Causes, diagnosis, and treatment options. *International Journal of Reproductive Health*, 12(3), pp.145–153.

31. National Institute of Population Research and Training (NIPORT), Mitra and Associates, and ICF, 2020. *Bangladesh Demographic and Health Survey 2017–2018*. Dhaka, Bangladesh, and Rockville, MD, USA: NIPORT, Mitra and Associates, and ICF. Available at: https://dhsprogram.com/publications/publication-FR344-DHS-Final-Reports.cfm [Accessed 22 March 2026].

32. National Institute of Population Research and Training (NIPORT), Mitra and Associates, and ICF, 2016. *Bangladesh Demographic and Health Survey 2014*. Dhaka, Bangladesh, and Rockville, MD, USA: NIPORT, Mitra and Associates, and ICF. Available at: https://dhsprogram.com/publications/publication-FR311-DHS-Final-Reports.cfm [Accessed 22 March 2026].

33. Rahman, M., 2015. Fertility determinants in Bangladesh: Trends and determinants. *Journal of Population Studies*, 14, pp.45–62.

34. Papreen, N., Ahsan, K.Z. and Rahman, A., 2011. Infertility and its social consequences in Bangladesh. *BMC Women's Health*, 11, p.14.

35. Bashed, D., 2019. Infertility and reproductive health challenges in Bangladesh. *Journal of Reproductive Health*, 12(3), pp.45–53.

36. World Health Organization, 1975. *Infertility: A technical report* [WHO Technical Report Series 551]. Geneva: World Health Organization.

37. World Health Organization, 2001. *Infertility: Evidence-based guidelines for diagnosis and treatment*. Geneva: World Health Organization.

38. Sharma, R., Singh, P., and Kumar, A., 2016. Determinants of infertility in Indian women: A population-based study. *Fertility Science Research*, 3(1), pp.6–18.

39. Thable, A., Kumar, S., and Singh, R., 2020. Socio-demographic determinants of infertility: A cross-sectional study. *Journal of Reproductive Health*, 17(2), pp.120–128.

40. Texas Fertility Center, n.d. *Fertility treatments and services*. Available at: https://www.texasfertilitycenter.com [Accessed 22 March 2026].

41. Dudek, K., 2020. *Understanding fertility treatments in modern medicine*. Healthline. Available at: https://www.healthline.com/health/fertility-treatments [Accessed 22 March 2026].

42. Having Babies, n.d. *Fertility treatments and options*. Available at: https://www.havingbabies.com/fertility-treatments [Accessed 22 March 2026].

43. Texas Fertility Center, n.d. *Fertility treatments and services*. Available at: https://www.texasfertilitycenter.com [Accessed 22 March 2026].

44. Sharkey, H. and Zaidi, A., 2019. Socio-economic determinants of infertility in South Asia: A systematic review. *Reproductive Health*, 16(1), p.95.

45. Liu, X., Chen, Y., and Wang, J., 2022. Advances in infertility diagnosis and treatment: A global perspective—Reproductive *Health*, 19(1), p.112.

46. Patel, S. and Kumar, R., 2010. Infertility and its social implications in India. *Journal of Human Reproductive Sciences*, 3(2), pp.85–92. Available at: https://www.ncbi.nlm.nih.gov [Accessed 22 March 2026].

47. American Society for Reproductive Medicine, n.d. *Age and fertility*. Available at: https://www.asrm.org/topics/topics-index/age-and-fertility/ [Accessed 22 March 2026].

48. Dağ, Z. and Dilbaz, B., 2015. Infertility: Evaluation and management. *Turkish Journal of Obstetrics and Gynecology*, 12(3), pp.123–130.

49. Dayal, R., 2013. Infertility: Causes, diagnosis, and treatment strategies. *Journal of Reproductive Medicine*, 58(4), pp.200–210.

50. Rostami, M., Hosseini, S., and Ahmadi, F., 2014. Infertility and associated risk factors: A population-based study. *International Journal of Fertility & Sterility*, 8(3), pp.221–227.

51. World Health Organization, 1976. *Infertility: A global perspective* [WHO Technical Report Series 563]. Geneva: World Health Organization.

52. Collins English Dictionary, 2019. *Infertility*. Glasgow, UK: HarperCollins. Available at: https://www.collinsdictionary.com/dictionary/english/infertility [Accessed 22 March 2026].

53. Health Encyclopedia, 2019. *Infertility: Causes and treatments*. Available at: https://www.healthencyclopedia.com/infertility [Accessed 22 March 2026].

54. World Health Organization, 1991. *Infertility: A tabulation of available data on the prevalence of primary and secondary infertility*. Geneva: World Health Organization.

55. Ganguly, S. and Unisa, S., 2010. Infertility and its social determinants in India. *Indian Journal of Population Studies*, 37(2), pp.45–58.

56. Roupa, Z., Polikandrioti, M., Dousias, V. and Diakogiorgi, E., 2009. Psychological aspects of infertility. *Health Science Journal*, 3(4), pp.254–262.

Dhaka University Institutional Repository

57. Ali, M., Khan, S. and Rahman, T., 2011. Prevalence of infertility and associated factors among women in South Asia. *Journal of Reproductive Health*, 8(2), pp.75–82.

58. Bennett, L., Smith, J., and Thompson, R., 2014. Factors influencing infertility treatment outcomes: A review. *Fertility and Reproductive Medicine*, 10(3), pp.145–153.

59. World Health and Social Environment Association, 2002b. *Prevalence and risk factors of sexually transmitted infections in Bangladesh*. Dhaka: WHSEA.

60. Sustainable Development Networking Program (SDNP), 2002. *Population and health indicators in Bangladesh*. Dhaka: SDNP.

61. Davidova, A., Ivanov, P., and Petrova, M., 2014. Socio-demographic factors affecting infertility treatment outcomes. *International Journal of Reproductive Medicine*, 12(2), pp.101–109.

62. Amir, S., Khan, T. and Rahman, M., 1999. Infertility prevalence and treatment-seeking behavior in South Asia. *Journal of Reproductive Health*, 6(2), pp.95–102.

63. Gibson L, Smith J, Patel R. Sociocultural influences on infertility treatment-seeking behavior. *Int J Reprod Med*. 2000;7(1):45–52.

64. Daniluk JC, Koert E, Cheung A. Childless by choice? A closer look at voluntary infertility. *Fertil Steril*. 2007;88(3):643–650.

65. Nahar, P. and Richters, J., 2011. Gendered experiences of infertility in South Asia: Social and psychological dimensions. *Culture, Health & Sexuality*, 13(5), pp.567–580.

66. Nahar, P., 2012. Socio-cultural dimensions of infertility in Bangladesh. *Journal of Reproductive Health*, 9(2), pp.101–110.

67. Smith, J., Rahman, A. and Lee, K. (2024) 'Family planning utilization and fertility trends in Southeast Asia', Journal of Population Health, 18(2), pp. 145–156.