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SCOPING REVIEW **OPEN ACCESS**

Knowledge, Attitudes, and Practices of Women and Men Towards Infertility: A Scoping Review

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Abstract:

Background: Infertility is a serious concern with emotional and medical implications, affecting millions of couples worldwide. Despite its prevalence, there are still misconceptions and a lack of knowledge and awareness surrounding infertility.

Objectives: The objective of this review is to synthesize the existing literature on knowledge, attitudes, and practices of men and women towards infertility.

Methods: The scoping literature review followed the Arksey and O'Malley's framework, which included formulating the research question, locating relevant studies, selecting studies, charting data, and synthesizing the results. The databases used were MEDLINE, Africa-Wide Information, Academic Search Complete, Family & Society Studies Worldwide, CINAHL, APA PsycInfo and Google Scholar. Thematic analysis was utilized to analyse the findings of this review.

Results: Twelve studies were included in this scoping review. The analysis of these studies produced six themes: women's concerns regarding infertility, lack of knowledge and awareness regarding infertility, different types of educational information on reproductive health, attitudes towards infertility, practices related to infertility and gender-based treatment, responsibilities, and consequences of infertility.

Conclusion: The review revealed that men and women consulting in healthcare facilities reported several misunderstandings and information gaps regarding infertility. Regarding attitude, the review found that most men and women demonstrate a positive attitude towards infertility as a disease and regarding the use of fertility drugs for conception. Furthermore, the review found that most men were willing to adopt necessary lifestyle and health practices to enhance or improve their fertility. The use of alternative therapy was also a prominent healthcare option amongst most men and women. Lastly, infertility has been known to cause marriages into divorce or polygamy.The results highlight the need for better healthcare to properly treat infertility. Furthermore, the review identified the need for education programs to address the stigma and misconceptions associated with infertility.

Keywords: Knowledge, Attitudes, Practices, Infertility, Women, Men, Couples, Primary health care.

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1. INTRODUCTION

Infertility is a high-impact worldwide health issue affecting millions of couples [1]. Most couples struggling with infertility can identify a specific cause [2]. The three (3) most common causes of infertility are ovulatory dysfunction, male factor infertility, and tubal disease, with

unexplained infertility being less common [3]. According to Borumandnia, Khadembashi and Alaii the primary and secondary infertility prevalence rate (PSIPR) is always lower in men than women [4]. Furthermore, the prevalence of primary infertility in men and women has decreased over time in high-income countries [4, 5]. Other regions, such as the Middle East and North Africa, also noted a similar decrease [4]. Although the secondary infertility prevalence in Asian, European, and most high-income countries has declined over time, other areas such as the Middle East, North Africa, and South Asia noted an increase in the trend for secondary infertility prevalence rate in both men and women [4, 6].

Over the years, the advancement of medical science has given many infertile couples hope, especially in developed countries [7, 8]. However, infertile men and women still face severe social, psychological, and financial consequences in developing countries, and the economic constraints are the main reason many infertile couples do not seek and/or receive reproductive health care [9, 10].

Fertility and infertility both have an impact on population growth [4]. Different regions have different demographic trends. Sub-Saharan African regions, which are some of the poorest countries, have rapid population growth and high fertility rates, however, developed countries are experiencing a decline in population growth due to ageing and decreased fertility rates [11].

In many African countries, men and women who suffer from infertility experience a lack of community support [12]. Instead, they are discriminated against and considered failures as they fail to contribute to population growth [9]. This, in turn, has a negative impact on their psychological well-being [13]. Furthermore, infertile women suffer from violence, physical, verbal, emotional and financial abuse, often leading to separation or divorce [9]. According to Rachou, culture, religion and tradition play an important role in the actions and views of every individual. [9]. In developing countries, a lack of awareness regarding infertility influences societal norms and behaviours, ultimately impacting the individuals' attitudes, habits and health-seeking behaviours [9]. Therefore, this scoping review seeks to synthesize the existing literature on the knowledge, attitudes and practices of women and men towards infertility.

2. METHODS

According to Arksey and Omalley, a scoping review is advantageous to investigate a study area which has previously not been reviewed in depth [14]. This is the case regarding the knowledge, attitudes and practices of men and women towards infertility. This scoping review was done in accordance with Arksey and O'Malley's scoping review framework [14, 15]. The review followed the following steps: 1) Identifying the research question, 2) Identifying relevant studies, 3) Study selection, 4) Charting the data, and 5) Collating, summarising, and reporting the results. These five (5) stages were a framework and guide in this review.

2.1. Identifying the Research Question

This scoping review considered information associated with knowledge, attitudes and practices of men and women towards infertility by reviewing available literature and identifying potential gaps in research. The research question that guided this scoping review was:

"What is known from existing literature about men and women's knowledge, attitudes and practices towards infertility?"

To ensure eligibility, the research question was determined by the use of literature studies that focused on the knowledge, attitudes and practices of men and women towards infertility globally. The population-concept-context (PCC) framework recommended by the Joanna Briggs Institute was followed in this process [16] (Table **1**).

Table 1. PCC framework [16].

PCC Element	Determinant
Population	Men and women.
Concept	Knowledge, attitudes and practices towards infertility.
Context	Globally.

2.2. Identifying Relevant Literature

The databases used for this scoping review were MEDLINE, Africa-Wide Information, Academic Search Complete, Family & Society Studies Worldwide, CINAHL, APA PsycInfo and Google Scholar. These databases were selected due to their capacity to identify a wide range of relevant infertility-related literature that would address the research question. The literature search time frame for this scoping review was for articles published between 2009 to 2023. The aim of not having a time frame for this review was to ensure that the study reports a broad coverage of studies and health policies. The reviewer used the Boolean search strategy using the operators "And" and "OR". The operator "NOT" was not used and the setting on fields was set to all fields as the reviewer did not want to limit the search. Additionally, the researcher set the field to "abstract" and repeated the search to ensure it was comprehensive [15].

The combination of terms used during the search was as follows: "Knowledge" OR "Education" OR "Understanding" OR "Awareness" AND "Attitudes" OR "Perceptions" OR "Opinions" OR "Thoughts" OR "Feelings" OR "Beliefs" AND "Practices" OR "Strategies" OR "Approaches". Also, "Infertility" OR "Infertile" OR "Fertility issues" AND "Women" OR "Female" OR "Woman" OR "Females" AND "Male" OR "Men" OR "Man" OR "Males"

2.3. Study Selection

The search was guided by an inclusion and exclusion criteria. The selection of studies included in this review were based on the following inclusion criteria:

- Articles that included men and or women as a population.
- Articles that focused on infertility as a subject of focus.
- Articles that were published in English.
- Articles from studies conducted globally.

2.4. Data Extraction

Two (2) reviewers (VNM and NVS) carried out the data extraction independently. To guarantee consistency, they evaluated on (1) article together. After that, they met to discuss the extractions and work out their differences until they reached an agreement.

2.5. Data Analysis

The search included six (6) databases and twenty-nine (29) articles. After the screening process, only twelve (12) articles met the inclusion criteria. The selection process of the articles is summarised in Fig. (**1**) below. The data analysis method used was thematic [15]. The reviewers read through the several articles to become familiar with the sources and develop codes by labelling different and notable information from the articles. This was followed by theme development to look for overlaps and similarities while considering the research question, aims and objectives. Once the themes were identified, they were reviewed, defined, and named to finalise the process [15].

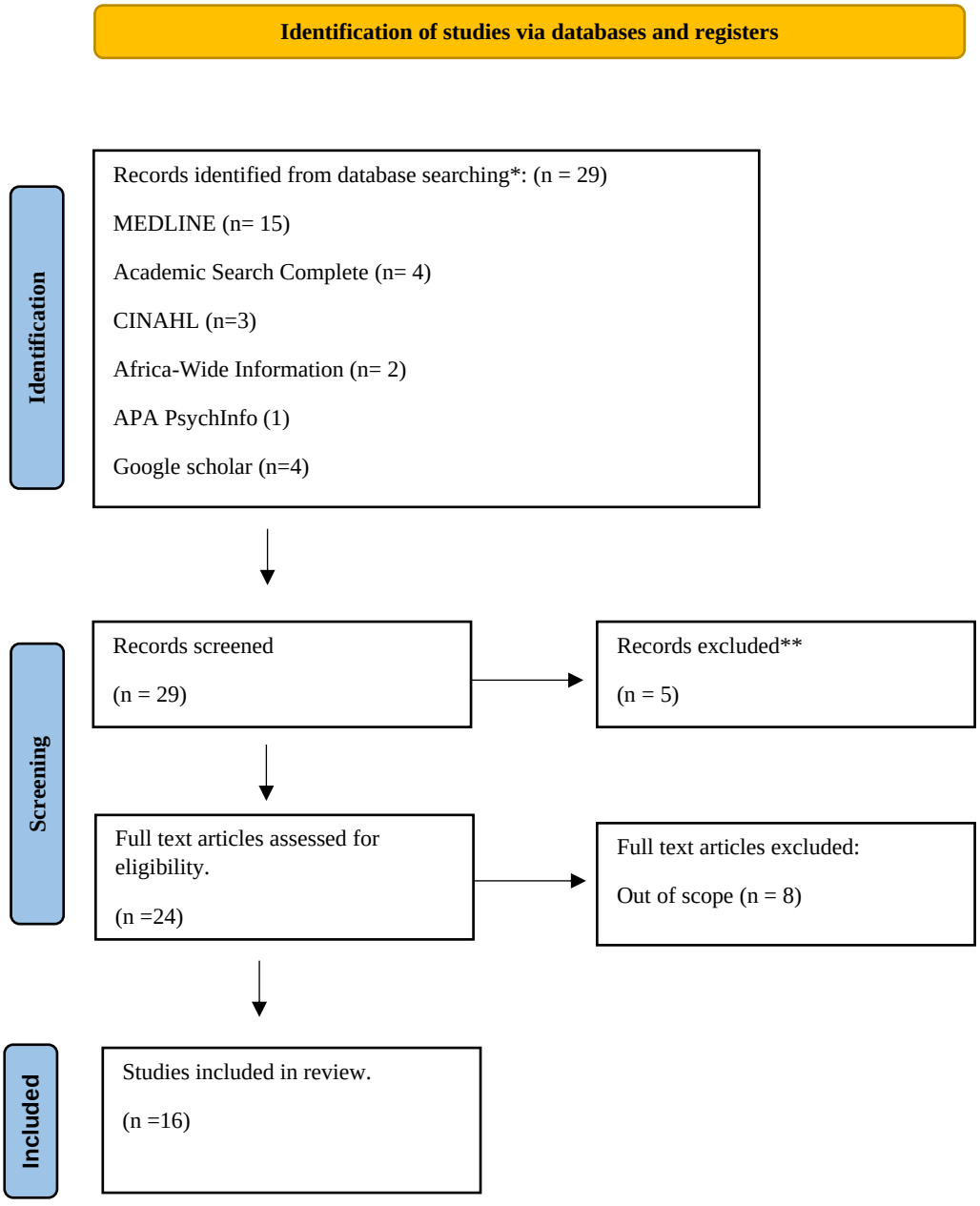

Fig (1). PRISMA diagram of the article's selection process (Source: Adapted from the 2009 PRISMA flow diagram).

3. RESULTS

This scoping literature review looked to identify what is known from existing literature about men and women's knowledge, attitudes and practices towards infertility. The screening process included twelve (12) studies, and from these articles, six (6) themes, namely: Women's concern regarding fertility, Knowledge and awareness of infertility amongst men and women, Types of educational information and access regarding infertility, Attitudes towards infertility, Practices related to infertility and Gender-based treatment and consequences of infertility were identified.

3.1. Charting Data

Sixteen (16) studies were included in this review. Two (2) studies identified used qualitative research designs [17, 18]. Fourteen (14) studies were quantitative and only two (2) studies were qualitative. All fourteen (14) articles were reviewed using the following organization categories: study title and author, research design, population and context, data collection method, data analysis method and study results. Ten (10) of these studies focused on women [17-26], the other four (4) focused on both men and women (couples) [27-30].Three (3) studies were conducted in Indonesia [17, 25, 27], two (2) in India [24, 28], two (2) in China [26, 31], two (2) in Europe [30, 32]. Two (2) studies in Australia [22, 33] and one (1) in the USA [19]. One (1) study was conducted in Saudi Arabia, and others in Pakistan and Jordan [18, 21, 23, 29]. Six (6) studies were conducted at fertility clinics [17, 18, 24, 28, 29, 33]. Six (6) studies were conducted online [19, 21, 26, 27, 30, 32] and one (1) at a gynecology clinic, one (1) at a urology unit in a hospital, one (1) at a health care centre, another one (1) at a general practice [23, 25, 31, 34]. The studies included in this review are summarised in Table **2** below.

Table 2. Summary of the studies included in the review [15].

Author/s, Study Title and Country/Refs	Research Design	Population and Context	Epidemiological Parameters	Data Collection Method	Data Analysis Method	Study Results
Lundsberg, L.S., Pal, L., Gariepy, A.M., Xu, X., Chu, M.C. and Illuzzi, J.L. (2014). **Knowledge, attitudes, and practices regarding conception and fertility: a population-based survey among reproductive-age United States women** [19] **Unites states of America.**	Quantitative study	Women, online survey in the United States of America.	**Age:**18-40 years. **Education:** 80% had a college degree. 50% employed full or part-time. **Socioeconomic status:** middle to lower class. **Area:** city, urban and rural.	Online survey	Descriptive statistics	US women of reproductive age showed a lack of understanding on conception, ovulation, and fertility.
Bennett, L.R., Wiweko, B., Bell, L., Shafira, N., Pangestu, M., Adayana, I.P., Hinting, A. and Armstrong, G. (2015). **Reproductive knowledge and patient education needs among Indonesia women infertility patients attending three fertility clinics** [17] **Indonesia.**	Qualitative study	Married, infertile women at a fertility clinic in Indonesia.	**Age:**18-45 years. **Education:** 86% completed senior high school or tertiary education. 60% had a tertiary degree. **Socioeconomic status:** middle to upper class. **Area:** urban and rural.	Interviews	Descriptive and categorical analysis using STATA.	Cconsultants on infertility were named as the best informational resource. Most patients knew that both male and female variables contribute to infertility, most could tell the difference between sterility and infertility, and some could even pinpoint their window of fertility. Most patients stated a need for more information regarding infertility and reproduction. Very little was known by the patients about the causes and treatments of infertility
Mushlih, Y., Adli, I., Araysi, L.A., Suryoadji, K.A., Indra Rachman, R., Nurullah, G., Indy Christanto, R.B., Savira, M., Shah, R., Agarwal, A. and Widyahening, I.S. (2023). **Knowledge, attitudes, and practices regarding male infertility: A cross-sectional study among infertile couples visiting fertility clinics in Indonesia's urban areas** [27]. **Indonesia.**	Quantitative study	Infertile couples, online survey in Indonesia.	**Age:** Grouped into 2:> 35 years (n =268), < 35 years n=110). **Education:** Most had a higher education qualification, and some had a high school certificate. **Socioeconomic status:** Middle to upper class. **Area:** urban area.	Web-based survey	Descriptive statistics: SPSS 25.0 (IBM, Armonk, NY) & bivariate Analysis.	Participants primarily consulted obstetrician-gynecologists over neurologists, despite possessing adequate knowledge, attitudes, and practices regarding male infertility. There was some stigma and misconceptions surrounding male infertility.

(Table 2) contd.....

Author/s, Study Title and Country/Refs	Research Design	Population and Context	Epidemiological Parameters	Data Collection Method	Data Analysis Method	Study Results
Hampton, K. and Mazza, D. (2015). **Fertility-awareness knowledge, attitudes and practices of women attending general practice** [34] **Australia.**	Quantitative study	Women, general practice in Australia.	**Age**: 25->36 years old. **Education:** most had a university, and some had a high school diploma or certificate. **Socioeconomic status:** mostly middle class, followed by upper and middle class. **Area:** urban and rural	Questionnaire	Descriptive statistics analysis.	Some women showed interest in fertility awareness; small percentage correctly identify the menstrual cycles fertile phase. Counseling for women who use fertility awareness as a method of contraception should be based on their actual understanding.
Sami, N. and Saeed Ali, T., 2012. **Perceptions and experiences of women in Karachi, Pakistan regarding secondary infertility: results from a community-based qualitative study** [18] **Pakistan.**	Qualitative study	Married women, fertility clinic in Pakistan.	**Age:** 20-35 years. **Education:** most had a primary school certificate followed by a secondary school certificate. **Socioeconomic status:** mostly low class and some middle class. **Area:** urban area.	In-depth interviews	Descriptive and explanatory statistics analysis	The knowledge of women about the causes and scientific treatment options for infertility was limited resulting in inclination for traditional unsafe health care. Infertility was stated to result in marital instability, stigmatization and abuse specially for women with no live child
Kshrisagar, S.P. and Shirsath, A.S. (2018). **A cross-sectional study of fertile period awareness, knowledge, attitudes, and practice in infertile couples seeking fertility assistance** [28] **Pune, India.**	Quantitative study	Infertile couples, Fertility clinic in India.	**Age:**18-45 years. **Education:** most had a secondary school certificate, some primary school education and only a few had a degree. **Socioeconomic status:** low to middle class. **Area**: city.	Questionnaire	Descriptive statistics.	Most patients were unaware of the fertile window of the menstrual cycle and only few could accurately identify this window, indicating poor fertility awareness.
Jaber, K., Albdour, K., Ismail, O., Jaber, Y., Alsaras, A., Younis, A. and Muhaidat, N. (2023). **Knowledge, Attitudes, and Practices Towards Infertility Among Women Living in Jordan: A Cross-sectional Study** [21]	Quantitative study	Women, online survey in Jordan.	**Age:**18-55 years. **Education:** most had a bachelor's degree or higher education certificate. **Socioeconomic status:** middle to upper class. **Area**: city	Online questionnaire	Mixed method analysis.	Negative trends in the help-seeking behavior of women, and gaps in infertility-related knowledge. There is a need for educational programs addressing infertility and encouraging people to seek help when needed, emphasizing the role of PHC in managing fertility issues.
Hampton, K.D., Mazza, D. and Newton, J.M. (2013). **Fertility-awareness knowledge, attitudes, and practices of women seeking fertility assistance in Australia** [22].	Quantitative study	Infertile women, in fertility clinics in Australia.	**Age:** Grouped into 3: 25 years or less, 26-25 years, 36 years & older **Education:** most had a university degree; some had a higher certificate or a secondary school qualification. **Socioeconomic status:** lower, middle and upper class. **Area:** city and urban/metropolitan area.	Questionnaire	Descriptive statistics.	Only a few women were able to correctly identify the fertile window of the menstrual cycle. Poor fertility-awareness may be a contributing cause of infertility.

(Table 2) contd.....

Author/s, Study Title and Country/Refs	Research Design	Population and Context	Epidemiological Parameters	Data Collection Method	Data Analysis Method	Study Results
Abolfotouh, M.A., Alabdrabalnabi, A.A., Albacker, R.B., Al-Jughaiman, U.A. and Hassan, S.N. (2013). **Knowledge, attitude, and practices of infertility among Saudi couples** [29] **Saudi Arabia**	Quantitative study	Fertile and infertile couples, at a fertility clinic in Saudi Arabia.	**Age:**15-60 years. **Education:** most had a higher certificate or a high school qualification. **Socioeconomic status:** mostly middle to upper class. **Area:** urban area	Questionnaire	Mixed method analysis	A generally poor level of knowledge and a neutral attitude toward infertility. Mistaken beliefs commonly held by the study participants regarding the causes of infertility were Djinns and supernatural causes, black magic, intrauterine devices, and contraceptive pills. The healer/Sheikh was reported as the primary and secondary preference for infertility treatment and 4 of IVF patients, respectively. Compared with fertile patients, IVF patients were significantly less likely to favour divorce or marriage to a second wife *versus* if the woman could not have a baby. The patients with infertility had more favourable attitudes toward fertility drugs *versus* and having a test tube baby versus. Child adoption was accepted as an option for treatment by most IVF patients and fertile outpatients. Alternative treatments previously practiced by the IVF patients to improve fertility include practicing Ruqia, using alternative medicine, engaging in physical exercise, eating certain foods, and quitting smoking.
Dattijo, L., Andreadis, N., Aminu, B., Umar, N. and Black, K. (2016). **Knowledge of infertility among infertile women in Bauchi, Northern Nigeria** [23] **Nigeria.**	Quantitative study	Infertile women, a gynecology clinic in Nigeria.	**Age:** below 20 -45 years. **Education:** mostly complete secondary school, followed by primary school. **Socioeconomic status:** low to middle class. **Area:** urban and rural.	Questionnaire	Descriptive statistics.	There is low level of knowledge of infertility among infertile women, indicating a need for health education regarding infertility.
Mahey, R., Gupta, M., Kandpal, S., Malhotra, N., Vanamail, P., Singh, N. and Kriplani, A. (2018). **Fertility awareness and knowledge among Indian women attending an infertility clinic: a cross-sectional study** [24] **India.**	Quantitative study	Infertile women, in a fertility clinic in India.	**Age:**20->40 years. **Education:** most had postgraduate qualifications, followed by degrees, diplomas and high school certificates. **Socioeconomic status:** mostly middle to upper class. **Area**: city.	Questionnaire	Descriptive statistics.	Many women are unaware of the effects of age on their fertility, educational interventions are needed to improve knowledge. Fertility education and counselling targeted at young adults is essential.
Harzif, A.K., Santawi, V.P.A. and Wijaya, S. (2019). **Discrepancy in perception of infertility and attitude towards treatment options: Indonesia urban and rural area** [25] **Indonesia**	Quantitative study	Men and women, in a primary health care center and a tertiary hospital in Indonesia.	**Age:**18-59 < years. **Education:** most had a bachelor's degree, followed by a high school qualification. **Socioeconomic status**: middle to high class. **Area:** rural and urban.	Questionnaire	Descriptive statistics.	There is a lack of understanding, misleading myths, and a negative attitude towards infertility.
Kopp, Ju, K. Wang, M. Yuan., Y. Zheng, G. Ataman, W. Woodruff L.M. Chen, T.K. Chen, Q. and Xiao, S (2019). **A survey study of attitude and knowledge regarding female fertility preservation among reproductive health professionals in Fujian** [26]. **China**	Quantitative study	Reproductive health professionals (men and women.)	**Age:** 20-<50 years **Education:** Most had a bachelor's degree followed by a master's degree. **Socioeconomic status:** Upper to middle class. **Area**: old town.	Online questionnaire	Descriptive statistics	Most participants who were familiar with fertility preservation were willing to collaborate with oncologists on preserving patients' fertility while some participants were not familiar with the term fertility preservation. Some participants had never consulted by a cancer patient or an oncologist about the infertility risk from cancer therapy. Most of the participants had middle or low level of onco-fertility knowledge, which was significantly linked to their educational background.

(Table 2) contd.....

Author/s, Study Title and Country/Refs	Research Design	Population and Context	Epidemiological Parameters	Data Collection Method	Data Analysis Method	Study Results
Zhang, L., Gong, R.L., Han, Q.R., Shi, Y.Q., Jia, Q.A., Xu, S.D., Wang, L.Q. and Zhu, C.C. (2015). **Survey of knowledge, attitude, and practice regarding reproductive health among urban men in China: a descriptive study** [31].	Quantitative study	Chinese men.	**Age:**18 to 59 years. **Education:** most had completed senior high school foll9wed by junior high school then college. **Socioeconomic status**: middle to low class. **Area:** city/urban and township.	Questionnaire + interview	Descriptive statistics.	Half of respondents were aware of and declared a positive attitude about sexual physiology and safe sex. Most of them said they would visit a doctor when they had a reproductive disorder. Most believed that they could avoid contracting STDs (Sexually transmitted diseases) by cleaning their genitals after intercourse, additionally some indicated that they were unwilling to be friends with STD infected persons. Some of those with a reproductive system disorder refused to discuss it with friends or family members.
De Jonge, C.J., Gellatly, S.A., Vazquez-Levin, M.H., Barratt, C.L. and Rautakallio-Hokkanen, S., (2022). **Male attitudes towards infertility: results from a global questionnaire** [32]. **Europe**.	Quantitative study	European men.	**Age**: 30->60 years. **Education:** not indicated. **Socioeconomic status:** upper to lower class. **Area:** Northern, southern, eastern, and western regions of Europe.	Online questionnaire	Descriptive statistics.	Most men indicated that, their physician was not the primary source of information regarding their infertility. While most men viewed their infertility positively, a large majority were not very likely to talk about it. Most respondents indicated a lack of awareness or absence of male infertility support groups.
Meissner, C., Schippert, C. and von Versen-Höynck, F., 2016. **Awareness, knowledge, and perceptions of infertility, fertility assessment, and assisted reproductive technologies in the era of oocyte freezing among female and male university students** [30]. **Germany**.	Quantitative study	Male and female university students.	**Age:** mean age of 24.5 years. **Education:** university students **Socioeconomic status**: Low to upper class. **Area:** city.	Online questionnaire	Descriptive statistics.	Female students and students of non-medical degree programs were more likely to plan to have children earlier than male students or students of medical degree. Female sex or medical degree program was associated with an overall better knowledge about women's fertility. Gaps in knowledge about female fertility and the potential of ART were more pronounced in male students and students of non-medical degree programs. The better the participant's knowledge about fertility, the more likely the students would consider ART. Most students knew the principal of oocyte freezing but would not consider using it unless they had low ovarian reserves.

3.2. Collating, Summarising, and Reporting the Results

Six themes emerged from the thematic analysis of the studies included in this review. These themes are Women's concerns regarding fertility, Factors Influencing Sexual and Reproductive Health related to Fertility, Types of Educational Information and Service Access regarding Infertility, Perceived Beliefs regarding Infertility, Lifestyle Modifications and Practices towards Fertility and Gender-based Treatment and Consequences of Infertility. These themes are discussed in detail below.

3.3. Identified Themes

3.3.1. Theme 1: Women's Concern regarding Fertility

The results of this review revealed that most women who have not succeeded in becoming pregnant and giving birth after a specific age have different concerns regarding their fertility. According to Lundsberg [19], most women have concerns about their ability to conceive because fertility declines with age. Furthermore, in a study done in India, the findings revealed that most women between the ages of 20-30 had concerns about their fertility and felt the need to get a fertility assessment [24].

3.3.2. Theme 2: Factors Influencing Sexual and Reproductive Health related to Fertility

The results revealed that there are knowledge gaps and a lot of misconceptions across all age groups of men and women regarding sexual and reproductive health issues [21, 25, 29, 31]. In a population-based survey conducted in the USA, younger women demonstrated less knowledge about ovulation, fertility, and conception [19]. According to Lundsberg, Pal, Gariepy, Chu and Illuzzi older women tend to cling to myths and misconceptions about the reproductive system's functioning, the effects of sexual positions, and the timing of sexual activity on improving fertility and conception success [19]. Likewise, in India, Kshrisagar and Shirsath found that most couples believed they were aware of the fertility window in the menstrual cycle of a woman and used it in their attempts at conception [28]. However, only a few couples could accurately identify the fertile window. Furthermore, some

couples were ignorant towards the importance of identifying and utilising the fertile window when trying to conceive [22]. Similarly, in China, Zhang conducted a survey to assess the knowledge, attitude, and practice among urban men regarding reproductive health. The survey found that most of the men had some level of knowledge, however, it was insufficient; therefore, there were some aspects of reproductive health that need further public health education to the general population [31].

In Indonesia, Bennett found that some women correctly identified the fertile window and also distinguished the difference between sterility and infertility [17]. Similarly, in Nigeria, women with a higher level of education and employment had better knowledge regarding infertility compared to those with a lower level of education and those who were unemployed [23]. Moreover, significant correlations were found between knowledge, degree possession, a more significant household income and having previously visited a fertility clinic [23]. Dattijo, Andreadis, Aminu, Umar and Black argue that educated and financially well-off women have more knowledge regarding infertility due to their seamless access to fertility clinics for reproductive health care services [23].

There is a firm belief in misconceptions such as the use of contraceptives, intrauterine devices, supernatural spirits, and black magic causing infertility [25, 29]. This demonstrates a clear lack of knowledge and understanding regarding sexual and reproductive health and the true causes of infertility. Similar findings were noted in studies by Harzif, Santawi and Wijaya, including Jaber, Albdour, Ismail, Jaber, Alsaras and Younis, who found that most men and women believe that the use of contraceptives can cause infertility, and this was noted in both males and females [21, 25]. Furthermore, the literature review revealed that although most men and women are aware that infertility is a disease that affects both sexes, most of them are not aware that ageing, a history of STIs, an irregular menstrual cycle and obesity can cause infertility [18, 19, 35]. This demonstrates a lack of a basic understanding of the reproductive system and its functions.

Another knowledge gap identified is that most women are unaware of how long they should wait to seek fertility treatment after trying to conceive on their own [24]. However, most women seeking fertility assistance from a fertility clinic have attempted to conceive on their own for over a year [22]. Most of these couples are usually unaware of the various reproductive therapy alternatives available and how they operate [36]. Despite this, most of them understood the need for fertility treatments and assisted reproductive technology (ART) [24, 29, 30]. Evidently, in a cross-sectional study conducted in Indonesia, most men and women acknowledged and accepted the use of fertility drugs and ART to treat infertility [25].

3.3.3. Theme 3: Types of Educational Information and Service Access regarding Infertility

The results of the review in this theme noted a preference for acquiring education regarding sexual and reproductive health, including infertility. According to Kshrisagar and Shirsath, most men and women believe that they should be educated about infertility when they initially visit their doctor regarding their inability to conceive after a given time frame of trying to conceive naturally [28]. Additionally, Bennett, Wiweko, Bell, Shafira, Pangestu and Adayana identified that there is a need and demand for further written and verbal education to improve the knowledge of men and women regarding reproductive health and infertility [17].

Healthcare practitioners such as nurses and doctors are seen as reliable sources of educational information [17]. However, most men and women feel that during a medical consultation with a doctor or nurse, the time for interaction and education regarding infertility is limited. Additionally, there is a demand to increase infertility treatment access in more public hospitals, just as there is a need for educational health care packages, especially in PHC clinics [23, 36]. Evidently, most healthcare professionals have some knowledge regarding fertility and fertility preservation. A survey was conducted in China by Ke Ju to assess the attitude and knowledge of Health Professionals Regarding Female Fertility Preservation in young female cancer patients. The study found that most of the health professionals who were familiar with the concept of fertility preservation were willing to practice the concept and even collaborate with other healthcare professionals to preserve their patient's fertility [26]. Similar findings were noted in German university students where a survey to assess the awareness, knowledge, and perceptions of infertility, fertility assessment, and assisted reproductive technologies in the era of oocyte freezing among female and male university students was conducted. The survey found that students from medical degree programs had better knowledge regarding female fertility [30].

Nevertheless, a European survey assessing male attitudes towards infertility found that most European men did not regard their physician as their primary source of information regarding infertility. The survey also revealed a significant gap in the provision of male reproductive health care as well as the accessibility and availability of supportive resources for men affected by infertility [32].

3.3.4. Theme 4: Perceived Beliefs regarding Infertility

Literature findings in this theme revealed an overall favourable attitude towards infertility in both men and women [26-28]. Some men and women consider infertility a disease that affects both males and females and believe that it should be treated with fertility drugs [21, 29]. A similar attitude was noted towards infertility-related medical investigations, as most men and women prefer that both partners be investigated first in cases of infertility [25, 29].

3.3.5. Theme 5: Lifestyle Modifications and Practices towards Fertility

The results of the review in this theme revealed that

most men and women were willing to include different lifestyle modifications such as engaging in physical exercise, making dietary adjustments and ceasing smoking and drinking alcohol to improve their fertility [29]. Furthermore, most men and women practice religious or spiritual acts like reading the Quran or the bible for counsel or comfort when living with infertility [18, 29].

The review also identified that the use of alternative therapies, such as spiritual and traditional medicine, was a common practice [29]. A community-based study done among women in Pakistan found that the lack of awareness regarding the availability of ART treatment options caused most women to resort to using unsafe traditional healthcare practices [18]. Similar findings were noted in Saudi Arabia, where most men and women indicated that they considered a spiritual healer as their first and second preference for infertility treatment [29]. In addition, the literature review revealed that women would rather speak to a female doctor than a male one when addressing gynecology and fertility-related issues [21].

3.3.6. Theme 6: Gender-based Treatment and Consequences of Infertility

In this theme, the literature review identified gender-based treatment and consequences due to infertility. Women experience the most socio-cultural consequences associated with infertility. Women bear the blame for infertility [25]. Infertility leads to unstable marriages, abuse, and stigma, particularly for women stated Sami and Saeed Ali [18]. Most women have reported infertility to add strain to their marriages; furthermore, it affects how their community views them [21]. Consequently, most communities consider divorce due to infertility as a valid reason [21]. According to Harzif, Santawi and Wijaya [25], polygamy should be regarded as a valid solution for infertility, followed by child adoption and ART [29, 37].

4. DISCUSSION

The study aimed to identify what information is available regarding the knowledge, attitudes, and practices of men and women regarding infertility. The findings of this study revealed that women often worry about their ability to conceive, especially as they age without children. As a result, with age, most women expressed they felt a need to have their fertility assessments done [24]. Worry can cause stress, which is detrimental to women's fertility [38]. High levels of psychological stress have been identified as a cause of infertility in males and females [39, 40]. This finding highlights the importance of psychological support for both men and women going through infertility as a support structure. It is important to note that proactive fertility assessment in both men and women can reduce the psychological stresses associated with infertility in the future as fertility assessments can help identify reproductive health issues early, ensuring timeous treatment and management to preserve fertility and prevent infertility [41, 42].

The review also found that some men and women believed in a lot of misconceptions and had poor knowledge regarding ovulation, fertility and conception while others had desirable knowledge regarding these factors [21, 25, 29, 31]. Basic knowledge and understanding of ovulation, fertility and conception is essential for men and women of childbearing age, especially when trying to conceive [43, 44]. Additionally, most women lacked the knowledge of how long they should wait to seek fertility treatment after trying to conceive on their own [24]. Nonetheless, a correlation between level of education and knowledge was identified in this review, where most educated women had better knowledge regarding the functionality of the reproductive system and infertility [17, 23, 30]. These findings suggest that although educated men and women may not need infertility education, there is still a need to educate some women and men regarding fertility while seeking help for reproductive and health services within the healthcare system. Educating men and women while attending these services will enhance their knowledge and understanding thus promoting informed decision-making regarding the available health care options that men and women can opt for to prevent infertility and enhance their fertility in the future.

The review found that most men and women preferred to be educated regarding infertility at their initial visits to the doctor after having trouble conceiving for a while [28]. Most men and women also prefer to receive fertility health education from doctors and nurses; however, this is not always possible due to the limited time available during a consultation [28]. As a result, most men and women who seek to educate themselves on reproductive health-related information to improve their knowledge and fertility awareness resort to finding this information from websites [19, 20, 32]. These findings illustrated that health professional is the most trusted and reliable health education source due to their educational background and expertise [26, 45, 46]. However, not many people may receive information regarding fertility, especially in private health facilities, because most men and women who participated in these studies consulted private fertility clinics and general practitioners who mainly run busy practices [24, 27, 29, 35]. This could disadvantage other men and women of reproductive age who do not have the finances to pay for these services as they are expensive and not easily accessible. Therefore, these findings suggest the need to integrate fertility services into sexual and reproductive services offered by state-owned primary healthcare facilities to promote access to healthcare.

The findings of this review illustrated that most men and women are of the view that contraceptives, intrauterine devices, supernatural spirits, and black magic can cause infertility [29]. The belief that the use of contraceptives can cause infertility is a worldwide misconception [47, 48]. The fear of infertility in women is common and strongly associated with other concerns, such as being abandoned by one's spouse. Similarly,

supernatural causes such as God's wrath, witchcraft, black magic and spiritual powers are the common perceived causes of infertility. These findings suggest a need for more education regarding the causes and infertility along with the advantages and side effects of contraceptives to prevent the side effects of contraceptives from being mistaken for causes of infertility.

Furthermore, the literature review also illustrated that most couples were unaware of the available reproductive therapy treatments available but were open to the idea of making use of reproductive therapy and fertility drugs. It was also interesting to find out that both men and women reported positive attitudes towards fertility assessment amongst the couples. Despite this, the results of this review illustrated that women endured consequences related to infertility as compared to men. Many socio-cultural effects of infertility, such as stigma, shame, and rejection, mainly affect women [23]. These consequences compromise the mental health of women, resulting in stress, depression and isolation [21]. Additionally, many women face physical and emotional abuse, are forced into polygamy, or experience divorce due to infertility [29]. This indicates a need for more state-owned fertility clinics to increase accessibility to men and women of different socio-economic backgrounds. Additionally, full or partial cover of ART by health care insurance companies as more accessibility to fertility clinics will improve the knowledge and awareness of people of different socio-economic backgrounds regarding infertility, and this will help reduce the stigma associated with the disease.

The results of this review revealed those who were willing to make necessary lifestyle modifications from both men and women to enhance or improve their fertility. These practices include quitting drinking alcohol and smoking, exercising and eating healthily and the use of traditional and spiritual practices that are prevalent in many communities [29]. Spiritual practices such as reading the Bible or Quran were also identified as a coping mechanism or an act of spiritual comfort when experiencing infertility [49-51]. The use of alternative therapy and medicine was also identified as a common practice, while most females would rather consult with a female medical Dr when gynecology and fertility-related issues. This finding points to the need to explore the perspectives of women regarding their preferences of consulting a female doctor as opposed to other genders. The willingness of men and women to make health-related changes to improve or preserve their fertility indicated a positive attitude and optimism towards treating the disease. Likewise, the presence of religious practices can assist men and women going through infertility to remain grounded and reduce their stress levels.

CONCLUSION

The studies reviewed were found in high-income countries, middle-income countries and low-middle-income countries. However, there is minimal evidence of studies conducted in urban and rural settings of South Africa (SA) regarding the knowledge, attitudes, and practices of women and men towards infertility. Most of the studies were conducted in fertility clinics, followed by a gynecologist and general practitioner. This could be the reason why most of the people who have good knowledge regarding infertility are those who are educated and financially stable because these services are paid for in these health care facilities. Thus, there is a lower knowledge of infertility among less educated and poor people. Most men and women in this review had a positive attitude towards infertility as a disease and favoured practices and fertility assessments which would preserve their fertility and help treat infertility. Additionally, both men and women are willing to make use of fertility drugs as a treatment option.

RECOMMENDATIONS FOR FUTURE RESEARCH

Most of the studies were done among women only and followed by couples seeking help regarding infertility. Future research should consider conducting studies among men and to gain an accurate view of the knowledge, attitudes and practices relating to infertility.

No study has been found exploring the knowledge, attitude and practices towards infertility of men and women consulting in state-owned primary healthcare facilities in South Africa between 2009 to 2023. This information is of importance to decentralize fertility assessment and management in state-owned primary health care facilities in South Africa to promote access to these services among the general population of childbearing age and enhance their education and the need for timely fertility assessment and management.

LIMITATIONS OF THE STUDY

It is important to note that the review only included studies written in English; therefore, studies written in other languages that might have contributed valuable information were excluded.

AUTHORS' CONTRIBUTIONS

V.N., M., M.R., M. and N.V., S. V.N., M. and N.V.:Study conception and design were contributed; V.N., M., M.R., M. and N.V., S. and V.N., M. and N.V.: Sepeng collected the data, analysis and interpretation of results was presented; Sepeng drafted the manuscript.

LIST OF ABBREVIATIONS

ART	=	Assisted Reproductive Technology
PCC	=	Population-concept-context
PSIPR	=	Primary and secondary infertility prevalence rate
STDs	=	Sexually transmitted diseases
SA	=	South Africa
USA	=	United States of America

ETHICAL STATEMENT

The ethical approval was obtained from the Faculty of Health Sciences Research Ethics Committee at the

University of Pretoria, Pretoria, South Africa. The Ethics approval Reference No: 190/2023.

CONSENT FOR PUBLICATION

Not applicable.

STANDARDS OF REPORTING

PRISMA guidelines and methodology were followed.

AVAILABILITY OF DATA AND MATERIALS

The data sets supporting the findings of the article is available on Zenodo. URL: https://zenodo.org/records/14242564?token=eyJhbGciOiJIUzUxMiJ9.eyJpZCI6ImEyYTdkZDBhLWJhNjAtNDQwMC1iMjY2LTI3MjdlNGFiNzg3MiIsImRhdGEiOnt9LCJyYW5kb20iOiI1YTU3MjkyZTFmNzI4NzlmYTY5NmI4YTBhYTQ0NDMzMSJ9.7dGN9Cvz9HAf9XJElTnDJ8Zshh_o36_9f7pz9KBvwqCm2VPTg83mHwk1fYFtEtgpDLv3cYYPAUPKfyZ99NAhUA.

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CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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SUPPLIMENTARY MATERIAL

PRISMA checklist is available as supplementary material on the publisher's website along with the published article.

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