

Sexually transmitted infection knowledge and attitudes among Muslim women worldwide: a systematic review

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Abstract: 250

Word count: 4588

Number of tables: 3

Number of figures: 1

Abstract:

Background: Extramarital sexual relations are forbidden in Islam, and sexual health information is not readily available in Islamic communities, especially for women. This review aimed to explore sexually transmitted infection (STI) knowledge and attitudes among Muslim women worldwide.

Methods: A systematic review was conducted on seven electronic databases. We included qualitative and quantitative studies of female Muslim participants of reproductive age, focusing on STI knowledge and attitudes. A narrative synthesis approach was used with thematic analysis methods.

Results: Eighteen studies conducted in 13 countries were included. Three main themes were identified: poor knowledge and misconceptions, sources of sexual health information and information needs, and cultural influences on STI knowledge and attitudes. Generally, Muslim women had poor knowledge regarding STI signs and symptoms, prevention, diagnosis and treatment, in addition to many misconceptions. Negative attitudes towards people infected with HIV/AIDS were common, and attitudes were highly influenced by misconceptions and insufficient knowledge. Infected women tended to be subjected to more blame and judgement compared to men.

Conclusions: The review summarises knowledge and attitudes of Muslim women worldwide. We excluded studies that did not clearly state that the population included Muslim women, therefore many countries with Muslim populations are not represented in this review. Negative attitudes towards STI makes it harder for women to access sexual health information, STI prevention and treatment. This review highlights the need for culturally sensitive sexual health education for Muslim women. Future interventions would benefit from considering the wider personal and external barriers when developing sex education interventions.

Source of funding:

NA is a PhD student at UCL funded by King Saud University. The findings and conclusions reported are those of the authors and do not necessarily represent the official views of the funding organization.

Key words:

Sexual health, sexually transmitted infections, Culture, Religion, HIV/AIDS

Introduction

Sexually transmitted infections (STIs) have a significant impact on sexual and reproductive health and are increasingly becoming a public health concern worldwide. According to the World Health Organization, more than one million STIs are acquired each day (1). The majority of which, occurring among adolescents and young adults who are unaware that they are infected and lack the adequate sexual health knowledge (2). If left untreated, some STIs can cause irreparable damage to women's reproductive organs and could be transmitted from mother to child during pregnancy and childbirth (3).

In Islamic countries, extra marital sexual relations are prohibited by religion. It is commonly believed that those countries have the lowest rates of HIV/AIDS (4, 5). The prevalence of people living with HIV/AIDS in the Middle East and North Africa (MENA) region, which is predominantly made up of Islamic countries, is much lower than the world average (6). However, it is also believed that HIV/AIDS rates are significantly under reported (7). Recent available data revealed that the number of new HIV cases have risen between 2004 and 2014 by 26%, making the MENA region one of the fastest growing HIV epidemic globally (8). While some of this rise could be attributed to enhanced testing and reporting, a significant proportion of cases are new transmissions (7), and the public are commonly unaware of the extent of risk behaviours and the measures of prevention (4).

Since sexual relations outside of marriage are forbidden in Islam, it is assumed that people are abstaining from sexual relationships until marriage. However, this is not the case with some young Muslims engaging in extra/pre-marital sexual relations (9-11). Despite efforts by advocates calling for the need to educate young Muslims on sexual health issues, and providing services for those who need it, many countries fail to prioritise the issue. The reluctance is likely to be from the cultural sensitivity surrounding sexuality, and more specifically, young people's sexuality (12).

There is a specific risk of under detection of HIV/AIDS among women in the MENA region (13). Since sexual activity is influenced by gender roles, particularly in Muslim societies, Muslim women appear to be especially vulnerable. The vast majority of infections in the region are among men, and the main route for HIV transmission among women is marriage (13). For example, in Morocco 70% of infections among women are due to an infected spouse (14). A study in Lebanon suggested that healthcare providers expressed negative attitudes towards providing sexual health services for women and admitted that they would misrepresent facts about HIV to women whose husbands are infected with HIV, to avoid divorce and to preserve their marriages (15). In addition, risks related to sexual activity for both married and unmarried women are increased due to the lack of available

services. This review aimed to explore STIs knowledge, information sources, attitudes among Muslim women worldwide, and identify the barriers to STIs prevention, diagnosis and treatment.

Methods

Design

A systematic literature review was conducted following the Centre for Reviews and Dissemination guidelines (16). A narrative synthesis approach was used using thematic analysis methods. A study protocol was registered with Prospero (registration number: CRD42017081999) prior to conducting the review, with no changes to the original plan.

Search strategy

Seven electronic databases were searched: MEDLINE (via OvidSP), EMBASE (via OvidSP), WEB OF SCIENCE, PsycINFO (via OvidSP), Maternity & infant care (via OvidSP), CINAHL (via the EBSCO Host), and POPLINE. We searched a number of grey literature databases (Openlit, Ethos, Popline) and there was a limited number of studies, none of which were eligible for this review. Details of the search strategy can be found in additional file 1. Where applicable, MeSH terms were selected and exploded to identify articles where different terms were used for the same concept. Where MeSH terms were not available, free-text search terms were used. The search was carried out in January 2017, the start date was set to 2007 onwards. We have limited the search to the last 10 years to provide the most relevant and recent literature because the patterns of STI epidemiology and STI treatment change over time. The search was updated in March 2018. Search terms used fell broadly into three categories: Population terms [including Islam; Muslim(s); Islamic countries; Middle East; North Africa; MENA], Gender terms [including woman/women; female(s), girl(s), wives/wife; lady/ladies], and sexual health terms [including sexual health; women's health; sexually transmitted diseases; sexually transmitted infections; sex education; sex counseling].

Eligibility criteria

Inclusion criteria

- Participants included female Muslims of reproductive age (15-49). Where studies also included non-Muslim or male participants, findings relevant to Muslim women were extracted.
- Studies focusing on STI knowledge, attitudes, information sources, and barriers to STI testing and diagnosis were included.
- Both qualitative and quantitative studies were included.

- Any country with a Muslim population was included.
- Publications in all languages were eligible.

Exclusion criteria

- Studies were excluded if the outcomes were not reported, male and female results were not reported separately, or if Muslim results were not reported separately.
- Studies conducted in a non-Muslim country or countries where less than 90% of the population are Muslims, unless clearly stated that the study participants are Muslim females it was excluded.
- Intervention studies were excluded because they were measuring the effects of an intervention on a specific population. Studies focusing exclusively on clinical treatments and outcomes, the physiology /pathology of the reproductive health system, and pregnancy outcomes were excluded.
- Studies where the participants were healthcare professionals were excluded, as their knowledge/attitudes can be different from general public.
- Studies in the form of editorials, conference abstracts, and policy documents were excluded.

Selection criteria

Two reviewers (NA & SA) independently assessed all studies for inclusion and screened title, abstract, and full text. All disagreements were resolved by consensus.

Data extraction

A standardised data extraction form was developed to help in systematically identifying participant characteristics, study design, aims, data collection methods, methods of data analysis and main findings for all included studies. Separate extraction forms were developed for qualitative and quantitative studies. Excel spreadsheets were used to extract the main findings from quantitative studies. NVivo software (17) was used to facilitate the data management and synthesis processes. Reviewer (NA) extracted all data from all included full texts. Second reviewer (SA) reviewed a random selection of 50% of the extracted data and assessed the quality of (50%) of the full texts. All disagreements were resolved by consensus. If reviewers required more information, authors were contacted.

Quality assessment

For this review, the quality of qualitative studies was assessed using the Critical Appraisal Skills Programme tool (CASP)(18). This tool is used to evaluate the trustworthiness, relevance, and result of published literature.

The quality of quantitative studies was appraised using the quality assessment tool developed by Centre for Evidence Based Management (19). This tool is used to appraise the methodological quality of cross-sectional surveys, and address questions on the representativeness of the sample, response rate, validity of the tools used and statistical significance. Both tools have been widely used to assess the quality of qualitative and quantitative evidence. Studies were not excluded based on quality, but the quality assessments were used to help determine confidence in the findings.

Data analysis

The data in this review were synthesised using a narrative synthesis approach (20) which allows for the synthesis of both quantitative and qualitative evidence. All relevant data presented in the included studies were extracted, including participant quotes. A meta-analysis was not conducted due to the variation in measurements used across the included studies. Thematic analysis was used for this review(21), which is one of the tools that could be used in the process of narrative synthesis and can be applied to both qualitative and quantitative evidence. The first author (NA) developed the initial coding and two authors (SA and JB) have checked all codes to ensure that the codes reflected the data. Codes were then discussed, and any necessary amendments were made until full agreement was reached. After completing the thematic analysis, the codes of both qualitative and quantitative studies were merged and tabulated. The data was then translated into common categories/headings to allow for useful comparisons of the results. Overarching themes were then developed and discussed by the review team. Throughout the analysis process we actively looked to identify negative cases which allowed for further in-depth exploration and understanding of the data and discussion. Finally, all included studies were revisited to ensure the themes representation of all relevant data. Participant quotations from the primary studies were presented throughout the results to illustrate review findings.

Results

From the database search 9,902 citations were retrieved. After removing duplicates, 6,258 were screened for eligibility (Figure 1). Our results were based on 18 studies, 16 quantitative and two qualitative. The studies assessed Muslim women's STIs knowledge on modes of transmission, symptoms, prevention, treatment, attitudes towards STIs including HIV, barriers to testing and diagnosis, and the influence of culture and religion on sexual health knowledge and attitudes. Fourteen studies were conducted in the MENA region, and four studies in Australia, Afghanistan, Pakistan and United Kingdom (UK). Included studies' characteristics are presented in Table 1.

Quality appraisal

As shown in the critical appraisal table 2 and 3, most included studies were judged to be of acceptable quality. Seven quantitative studies were assessed to be of good quality (22-28). Good quality studies had an appropriate research design and provided clear description of their methodology. Five good quality studies reported on response rate (24-28), which were mostly high, except for one study with a response rate of 50% (26). Seven quantitative studies were assessed to be of fair quality (29-35). Although some of these studies had a sample representative of the target population (29, 31, 35), poor reporting made it difficult to assess the risk of selection bias in two studies (30, 33) and two studies used sampling strategies that had the potential to introduce bias (32, 34). Only two studies were judged to be of poor quality (36, 37). The method of selecting participants was not clearly described; therefore, it was difficult to assess the risk of selection bias. Samples in both studies were not based on consideration of sample statistical power (36, 37). The two qualitative studies were of good quality (38, 39). Both qualitative studies had a clear statement of the aims of the research, and a qualitative methodology was appropriate (38, 39). The results section for included qualitative studies was mostly discussed well and supported with relevant quotations and included appropriate implications for policy, practice and recommendations for new research.

The findings are presented below in three main themes:

Knowledge, myths and misconceptions about STI and HIV

1. Awareness of STI and HIV

Seventeen studies looked at participants' knowledge about STIs (22-38), nine studies have specifically focused on HIV/AIDS (22, 25-27, 29, 33-35, 37). A significant proportion of women studied had never heard of HIV/AIDS and many other STIs (22-35, 37). Two studies conducted in Saudi Arabia reported that only about half of the participants had good knowledge about STIs (defined as having answered 60% or more of the question correctly) (22, 37). In the studies that examined men's and women's knowledge about STIs, Muslim females had better knowledge about STIs compared to Muslim males, although knowledge was low for both groups (28, 29). One study in the UK examined knowledge of students from different religious backgrounds found that Muslim students had poorer knowledge than students from all other religions (28). The majority of women who were able to name an STIs mainly mentioned HIV/AIDS but had limited knowledge regarding the nature of the infection, modes of transmission, and prevention. Other STIs like chlamydia and human papilloma virus were less recognised (28, 30, 32, 38).

"I only know of HIV. I would assume it is transmitted through bodily fluids. I can't think of any others. I was never taught about them." – Australia (38)

II. Knowledge about STI signs and symptoms

Generally, Muslim women had poor knowledge regarding signs and symptoms of STIs, in addition to many misconceptions. Women in nine studies believed that you could identify an HIV infected individual just by looking at them (22-27, 33, 35, 37). In a study from Saudi Arabia, only 5% of university students knew that HIV can be asymptomatic (37). Similarly, a study in Iran conducted on soon-to-be-married women showed that only 4.5 % knew that a person with an STI does not necessarily look ill, and 78% did not know that painful urination could be a sign of an STI. A further 51% did not know that the presence of sores in genital area is an STI symptom in both men and women. Poor knowledge of STIs was found among university students as well as women who were unemployed and illiterate (24, 32).

III. Knowledge about modes of transmission of STI

Fifteen studies reported myths and misconceptions regarding modes of transmission of STIs among Muslim women (22-27, 29, 31-37, 39). Women in a number of studies believed STIs can be transmitted from mosquito bites with proportions ranging from 58% to 18%. Almost 70% of college women in the United Arab Emirates (UAE) believed that they are more likely to be infected when they are on their periods (26, 27, 29, 35-37). Sharing toilets and swimming pool were also mentioned as possible routes of transmission (24, 26, 29, 35-37), as well as physical contact such as hand shaking or hugging (26, 27, 29, 34-37).

A number of women in four studies could not identify correct modes of transmission of STIs. HIV transmission through breastfeeding was poorly recognised, with correct answers ranging from 70% to 18% (25, 33-35). Only 6% of young girls in one study knew that STIs can be transmitted through vaginal fluids, and 5% knew that HIV can be acquired through blood transfusion (24).

“HIV, well [...] it’s not exactly an STI. It’s more of a cancer, isn’t it? Also the thing called “crabs.” I learnt that from movies. I don’t know how you get it though.” – Australia (38)

Only two studies reported good knowledge about modes of STI transmission (33, 35). A study conducted with university students in three Arab countries reported that 90% of women correctly identified modes of STI transmission, although there were also many misconceptions. For instance, over 40% of participants believed that only homosexuals get HIV/AIDS (33).

IV. Knowledge about STI prevention and treatment

Lack of knowledge about STI prevention was observed among Muslim women (22-25, 27, 29-31, 33-35, 37). Nearly 93% of university students in UAE and 77% in Afghanistan believed that vaccinations could protect against HIV/AIDS (27, 29). Women were also generally unaware of condoms for STIs

prevention (25, 29, 30, 33-35, 37, 39), and only three studies reported good levels of knowledge regarding condom use with correct answers ranging from 74% to 67% (23, 24, 36).

“We have heard that HIV/AIDS spreads through sexual relations and by using certain measures such as contraceptives (condoms) we can protect ourselves. But there are people who are not aware of HIV/AIDS and contract the disease from sexual contacts”. – Pakistan (39)

Regarding treatment of HIV/AIDS, 66-43% of women in six studies believed that it is curable (23, 25-27, 29, 33). For example, a Demographic Health Survey in Palestine showed that 12.2% of women thought that HIV/AIDS can be treated by a traditional healer or folk medicine (25). Almost 20% of university students in Egypt did not know that if one person is infected, sexual partners need to be tested and treated (31).

Sources of information on STI and women’s information needs

Ten studies reported on Muslim women’s sources of sexual health information (23, 25, 27, 29-32, 35, 38, 39). Friends, relatives, magazines and television were the primary sources of information for women and girls (27). Education in schools was a source of STI information for a minority of women (8% to 31%) (22, 23, 25, 29, 32). A study in Egypt reported that 10% of participants felt ashamed to ask about sexual health-related information (31). Only 10% of university students in Turkey felt that information regarding sexual health issues received in schools was adequate (32).

Women and young girls in two studies wanted more information about STIs symptoms, transmission, prevention, and treatment, and many wanted to learn about sexual health issues in schools (24, 27).

“Although my religion says I do not need to know about sexual health before having sex, I think it should be taught because girls are still going to do that stuff [. . .] It could prevent a lot of mistakes from happening.” – Australia (38)

Cultural influences on STI knowledge and attitude

I. Negative attitudes towards HIV infected individuals

Women in ten of the studies had negative attitudes towards people infected with STIs and HIV/AIDS and were highly influenced by misconceptions and poor knowledge (22, 25-27, 29, 33, 35, 37, 39, 40).

“Our society considers those who are suffering from HIV/AIDS as having a bad personality, people will never sit, eat or have physical contact with them.” – Pakistan (39)

Negative attitudes were reported across studies from a range of different countries. For example, 32% of participants in a study from United Arab Emirates said that 'I do not feel sorry for people who caught HIV/AIDS because it is their own fault', 81% believed that those who transmit the infection should be punished, and 53% thought that people with HIV/AIDS should be made to live apart from the general public (27). In Palestine, only 15% said that people with HIV/AIDS should be allowed to teach (25). One study from the southwest region of Saudi Arabia reported that 8% of young female students thought that a person with HIV should be killed or punished (22).

Infected women tended to be subjected to more blame and judgement compared to men, and this gender inequality was considered normal (39).

"The society will disgrace a woman more than a man because our culture is like that." –
Pakistan (39)

II. Attitudes towards STI education, prevention and testing

Nearly 62% of women in one Iranian study believed that education about STIs and unintended pregnancies does not lead to premarital sex (24). However, some women in another qualitative study believed that there was no need for sexual education for Muslims, believing that STI are not an issue among them, or that religious practices provided them with protection against STIs (39).

Negative attitudes towards HIV/AIDS, and the perceptions that only certain individuals are at risk acted as a barrier to testing and diagnosis. For example, 38% of participants in a Saudi study said that they would not want to know if they had any kind of STI (30). Although 90% believed that their partners had the right to know if they had an STI, and 55% said that they would ask for a divorce if they found out that their partner had an STI (30).

Negative attitudes by healthcare providers towards premarital sex acted as a barrier to young girls' access to sexual health information and services (38).

"I would prefer a female GP. If it was male GP I would feel awkward, physically and emotionally, because he might ask me if I am married and judge me because I am not." –
Australia (38)

Discussion

This is the first review, to our knowledge, to synthesise qualitative and quantitative evidence on sexually transmitted infection knowledge and attitudes among Muslim women worldwide. Barriers to STI prevention, diagnosis and treatment existed on multiple levels from personal barriers, to cultural and religious barriers. Although this review included studies from all countries, the majority of studies in this review were conducted in the MENA region.

A key finding from our review is the poor overall STI knowledge among Muslim women, with HIV/AIDS being the most widely recognised STI. Although this review suggested that Muslim women's STI knowledge was higher compared to Muslim men, women's awareness of STI was still found to be suboptimal. This issue is particularly concerning since approximately 50% of included studies in this review focused exclusively on college students. A report on STI evidence from the MENA region confirms the results from this review. The report showed that although the majority of people in the region have heard of HIV/AIDS, they rarely knew how the infection is transmitted, and have little knowledge regarding other STIs (41). Poor sexual health knowledge poses a great risk to young Muslim women who engage in premarital sexual relations, and to married women whose husbands are not monogamous or are infected before marriage. These findings support existing evidence that supports the importance of sex education, particularly at school (42-44).

Previous literature suggested that better education is associated with higher levels of HIV/AIDS and STI awareness (45). However, this review revealed that poor knowledge existed among women of all educational levels. Since sexual health is not taught in any formal setting in most Islamic countries, educational level might have little impact on STI awareness. Even among highly educated people, lack of knowledge and misconceptions still exist. For example, a study examined physicians knowledge in Saudi Arabia reported that almost half of the sample identified casual kissing as a mode of HIV transmission (46).

Significant misinformation was also found regarding modes of transmission and prevention. Condom use was poorly recognised as measure of HIV prevention among Muslim women. However, literature suggests that Muslims with prior knowledge of condoms expressed difficulty accessing them (15). According to a report by Abu-Raddad and colleagues, awareness of condom use in Arab and Islamic countries did not predict use, and only a "fraction" of those who are aware of condom use as a measure of HIV prevention actually use them (7). It is likely that the majority of extra-marital sex in the region is not condom-protected (47). This is likely because premarital sexual relations are forbidden in Islam, making it difficult for young individuals to openly access condoms without being judged or stigmatised for engaging in them (4, 41). The issue is even more challenging for women, as they could face severe consequences for having premarital sexual relations (i.e. honour killing). Findings from another systematic review on non-Muslim youth showed that reasons for condom non-use often went beyond lack of knowledge and access barriers to social influences (48). Other reasons documented in the literature for not using condoms included partners' refusal, high condom prices, and low perceived risk of infection (47). Therefore, addressing awareness without taking into account social and cultural factors would only solve a part of the issue.

Social and cultural factors influence how STIs are perceived in Muslim countries, with many Muslims

believing that STIs are not an issue among them (40). STI rates are not commonly reported in some Islamic countries, which might contribute to the perception of low risk found among many Muslims. Stigma surrounding at-risk individuals, particularly men who have sex with men and extra-marital sex in general also adds to the denial of the existence of STIs and HIV/AIDS among Muslims (49). Findings from a review on South African youth suggested that low perceived risk resulted from societies' tendency to deny the presence of HIV/AIDS, specifically in societies with great stigma attached to HIV/AIDS (50). According to the Health Belief Model, low perceived vulnerability is a risk factor as it reduces the individual's motivation to take protective measures (51). Research indicates that higher perceived risk of STIs is associated with a more responsible sexual behaviour (50).

Cultural and religious factors play a crucial role influencing sexual health perceptions, sexual health knowledge and needs. A number of studies on women from different religious backgrounds suggest that conservative views and social disapproval of premarital sex significantly influenced sexual health awareness and safer sex practices (44, 52, 53). Therefore, for any educational intervention to work, it should be tailored to meet the target population's specific needs. Our review showed that many women expressed a need for sexual health education. Qualitative evidence on Muslim immigrants from Canada showed that women did not oppose sex education, but felt that the sex education offered did not reflect their needs (51). Research on religious leaders' views on providing sex education showed that the majority had positive views towards providing sex education for young Muslims, with emphasis on providing a religiously sensitive content (54). Efforts should be directed towards designing sex education programs that are religiously appropriate and accepted in conservative Muslim societies.

Limitations

The literature search was conducted online, thus some relevant literature may have been missed. We located studies of Muslim women from 13 countries worldwide. However, since we excluded studies that did not clearly state that the population included Muslim women, not all countries with Muslim populations are represented in this body of evidence. Most of the studies in this review were quantitative surveys, with only two qualitative studies. Qualitative evidence facilitates an in-depth exploration of issues and the close-ended nature of survey questions provides little opportunity for participants to give their detailed accounts (55). It was not possible to conduct a meta-analysis in this review as study outcomes were measured differently across included studies. A number of primary studies in this review lacked rigour in terms of their study design, selection of participants, and reporting of findings. Furthermore, all quantitative studies in this review were of cross-sectional design and provided only simple descriptive results, none of the results were

analysed by education or socio-demographic factors. However, due to the existing obstacles to conducting STI and HIV/AIDS research in the MENA region, Haghdoost and colleagues suggest that even simple descriptive studies and convenience sampling are an essential step to improving research in the region (56).

Policy implications

The findings from our review could be used to inform the development of a culturally sensitive sexual health education for Muslim youth. Many Muslims depend on guidance from religious leaders on many aspects of their lives. Having religious leaders on-board while promoting sexual health education, as well as wider community involvement, is essential to ensure that materials are clearly understood and accepted in conservative Muslim cultures. Therefore, a key implication from this review is providing comprehensive sexual health education, particularly at schools, while working with religious leaders, parents, and teachers. More public health efforts should also be directed towards increasing sexual health communication and awareness using mass media channels and the Internet to reach individuals at risk.

Implications for research

This body of evidence revealed that better quality studies particularly in the MENA region are needed. However, conducting high quality research might be a difficult task in some countries due to restrictions on data sharing and reporting (41, 56). Improved reporting and better surveillance are essential for accurate future estimates to inform public health policies and prevention measures.

Evidence on barriers to HIV/AIDS and STI testing among Muslims is limited; only one qualitative study examined barriers to testing and diagnosis (38). The limited research done in this area makes it difficult to draw conclusions. However, it provides insight into possible existing obstacles specific to conservative Muslim cultures. More research should be directed towards understanding and tackling barriers to STI testing and diagnosis among Muslims, particularly among women.

Conclusion

This review revealed that many Muslim women lacked proper sexual health knowledge, and that negative attitudes towards STIs acted as barrier to accessing sexual health information and services. The need for information and education was expressed by many women. This highlights the importance for culturally sensitive sexual health education for Muslim women. The risk and vulnerability of STIs among Muslim women went beyond lack of knowledge to wider cultural factors. Future interventions should take into account the wider personal, cultural, and religious barriers when developing sex education interventions.

Source of funding:

NA is a PhD student at UCL funded by King Saud University. The findings and conclusions reported are those of the authors and do not necessarily represent the official views of the funding organization.

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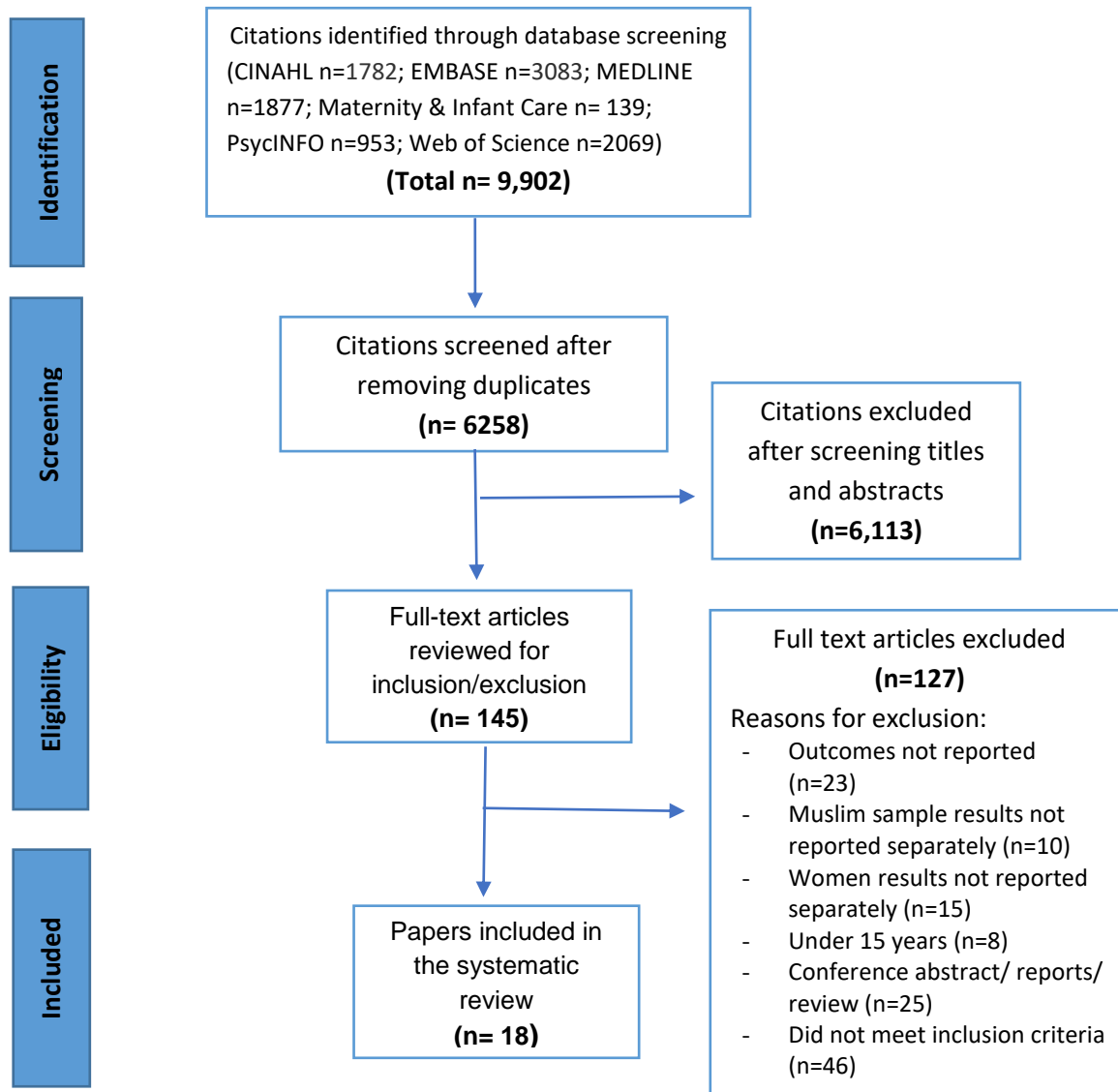


Figure 1: PRISMA flow diagram outlining the systematic review process

Table 1: Characteristics of the studies included in the review

Study Author (year)	Country	Design/data collection	Mean age of participants	Sample size	Sample characteristics	Response rate
Ganczak et al. (2007)	UAE	Cross sectional/ self-administered questionnaire	Mean=18.3	148	University students	89%
Husseini & Abu- Rmeileh (2007)	Palestine	Cross sectional/ Not reported	Mean=33.3 SD (0.136)	4,967	Ever-married women 15-49	88%
Coleman & Testa (2008)	United Kingdom	Cross sectional/ self-administered questionnaire	Not reported	335	Male and female students in school Years 11-13, aged (15-18)	99%
Fageeh (2008)	Saudi Arabia	Cross sectional/ self-administered questionnaire	Not reported	345	Female (18 – 25) year olds	Not reported
Mansoor et al. (2008)	Afghanistan	Cross sectional/ self-administered questionnaire	Mean=19.4 SD (1.8)	287	Male and female University students	75%
Al-Iryani et al. (2009)	Yemen	Cross sectional/ self-administered questionnaire	Mean=16.4 SD (0.9)	1,337	Male and female Students in school Years 11-13 aged (15-18)	Not reported
Badahdah & Foote (2010)	Kuwait, Bahrain, and Jordan	Cross sectional/ self-administered questionnaire	Mean=20.6 SD (1.4)	83 Kuwaiti 108 Bahraini 86 Jordanian	Male and female University students	Not reported
Salem et al. (2012)	Saudi Arabia	Cross sectional/ self-administered questionnaire	Not reported	95	Female secondary school students	Not reported
Bazarganipour et al. (2012)	Iran	Cross sectional/ Interview questionnaire	Mean=21.82 SD (1.14)	400	Female students in B.S or lower degree in non-medical universities.	Not reported
Bakri M (2013)	Saudi Arabia	Cross sectional/ Not reported	Not reported	250	Female University students	Not reported
El Gelany & Moussa (2013)	Egypt	Cross sectional/ interview questionnaire	Mean= 19.64 SD (1.40)	220	Female university students aged (17 - 23)	Not reported

Khajehei et al. (2013)	Shiraz	Cross sectional/ self-administered questionnaire	Mean=21.2 SD (4.4)	281	Men and women attending pre- marital screening classes	92%
Alkhasawneh et al. (2013)	Jordan	Cross sectional/ self-administered questionnaire	Mean=30	128	Any University student or employee over 18 years of age	Not reported
Hasnain et al. (2013)	Karachi, Pakistan	Qualitative Focus group discussions	Not reported	3 FGD - 20 per group	Males and females aged 17-21 years, unmarried, living in Karachi and belonging to different social strata.	N/A
Eksi & Komurcu (2014)	Turkey	Cross sectional/ not reported	Mean=19.85 SD (1.59)	420	First year university students	Not reported
Haroun et al. (2014)	UAE	Cross sectional/ self-administered questionnaire	Not reported	1,888	Male and female University students	50%
Rahimi et al. (2016)	Iran	Cross sectional/ self-administered questionnaire	Mean=29.4 SD (8.3)	411	Men and women aged (15-49) years living in Tehran	Not reported
Meldrum et al. (2016)	Australia	Qualitative Semi- structured interviews	Not reported	11 Semi- structured interviews	Women aged (18- 25) years who were living in Melbourne and identified as Muslim.	N/A

SD= standard deviation, N/A= not applicable

Table 2: Quality appraisal of quantitative studies

Questions	<i>1. Did the study address a clearly focused question / issue?</i>	<i>2. Is the research method (study design) appropriate for answering the research question?</i>	<i>3. Is the method of selection of the subjects clearly described?</i>	<i>4. Could the way the sample was obtained (selection) bias?</i>	<i>5. Was the sample of subjects' representative with regard to the population to which the findings will be referred?</i>	<i>6. Was the sample size based on pre-study considerations of statistical power?</i>	<i>7. Was a satisfactory response rate achieved?</i>	<i>8. Are the measurements (questionnaires) likely to be valid and reliable?</i>	<i>9. Was the statistical significance assessed?</i>	<i>10. Are confidence intervals given for the main results?</i>	<i>11. Could there be confounding factors that haven't been accounted for?</i>	<i>12. Can the results be applied to your organization\ Study?</i>
Author												
Ganczak et al. (2007)	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	N/A	Yes	Yes
Husseini & Abu-Rmeileh (2007)	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	No	Yes
Coleman & Testa (2008)	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	N/A	No	Yes
Fageeh (2008)	Yes	Yes	No	Can't tell	Can't tell	No	NR	Can't tell	Yes	N/A	Yes	Yes
Mansoor et al. (2008)	Yes	Yes	Yes	No	Yes	No	Yes	Can't tell	Yes	N/A	Can't tell	Yes
Al-Iryani et al. (2009)	Yes	Yes	Yes	No	Yes	No	NR	Yes	Yes	N/A	Can't tell	Yes
Badahdah & Foote (2010)	Yes	Yes	No	Can't tell	Can't tell	No	NR	Yes	Yes	N/A	Can't tell	Yes
Salem et al. (2012)	Yes	Yes	Yes	Yes	No	Yes	NR	Can't tell	Yes	N/A	Yes	Yes
Bazarganipour et al. (2012)	No	Yes	No	Can't tell	Can't tell	No	NR	No	NR	N/A	Can't tell	Yes

Bakri M (2013)	Yes	Yes	No	Can't tell	Can't tell	No	NR	Can't tell	No	N/A	Can't tell	Yes
El Gelany & Moussa. (2013)	Yes	Yes	Yes	No	Yes	No	NR	Can't tell	No	N/A	Can't tell	Yes
Khajehei et al. (2013)	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	N/A	Can't tell	Yes
Alkhasawneh et al. (2013)	No	Yes	Yes	Yes	No	No	NR	Yes	Yes	N/A	Yes	Yes
Eksi & Komurcu (2014)	Yes	Yes	No	Yes	No	No	NR	Can't tell	Yes	N/A	Yes	Yes
Haroun et al. (2014)	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	N/A	Yes	Yes
Rahimi et al. (2016)	Yes	Yes	Yes	No	Yes	Yes	NR	Yes	Yes	N/A	Can't tell	Yes

NR= not reported, N/A = for studies that did not report CI, the results were expressed as % therefore the question is not applicable

Table 3: quality appraisal of qualitative studies

Questions	<i>1. Was there a clear statement of the aims of the research?</i>	<i>2. Is a qualitative methodology appropriate?</i>	<i>3. Was the research design appropriate to address the aims of the research?</i>	<i>4. Was the recruitment strategy appropriate to the aims of the research?</i>	<i>5. Was the data collected in a way that addressed the research issue?</i>	<i>6. Has the relationship between researcher and participants been adequately considered?</i>	<i>7. Have ethical issues been taken into consideration?</i>	<i>8. Was the data analysis sufficiently rigorous?</i>	<i>9. Is there a clear statement of findings?</i>	<i>10. How valuable is the research?</i>
Hasnain et al. (2013)	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Valuable
Meldrum et al. (2016)	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Valuable

