

RESEARCH ARTICLE

Enhancing Knowledge, Beliefs, and Intention to Screen for Prostate Cancer via Different Health Educational Interventions: a Literature Review

Ahmad M Saleh^{1*}, Marjaneh M Fooladi¹, Wasileh Petro-Nustas¹, Ghadeer Dweik², Mohammad H Abuadas³

Abstract

Background: Prostate cancer is one of the most common cancers affecting men globally, constituting the sixth leading cause of cancer related death in males, and the eleventh leading cause of death from cancer in all age groups. In Jordan, prostate cancer is the third most common cancer in the male population, accounting for one third (6.2%) of cancer related deaths and in 2010 alone, 218 (9.4%) new cases were identified. **Objective:** To assess the effectiveness of different health education interventions aimed at enhancing knowledge, beliefs and intention to screen for prostate cancer. **Materials and Methods:** A literature search from January 2000 to April 2015 was conducted using the key words “prostate disease,” “educational program,” “knowledge,” “prostate cancer,” “demographic factors and prostate cancer,” “knowledge and prostate cancer,” “education for patients with prostate cancer,” “factors that affect intention to screen,” “knowledge, beliefs, and intention to screen for prostate cancer,” “impact of prostate educational program on beliefs,” and “impact of educational program on intention to screen.” **Results:** Majority of studies reviewed indicated that men had low levels of knowledge regarding prostate cancer, and mild to moderate beliefs with good intention to screen for prostate cancer. **Conclusions:** Most studies indicated that men’s knowledge levels about prostate cancer were poor and they had mild to moderate beliefs and intentions to screen for prostate cancer. Therefore, development of an assessment strategy based on the Health Belief Model seems essential. An effectively designed and implemented educational program can help identify the needs and priorities of the target population.

Keywords: Literature review - prostate cancer - knowledge - beliefs and intention to screen - educational programs

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Introduction

Prostate cancer is defined as the development of cancer in the prostate gland in the male reproductive system (National Cancer Institute, 2015a). Most prostate cancers are slow growing; however, some grow relatively fast (Stewart and Wild, 2014; National Cancer Institute, 2015b). The cancer cells may spread from the prostate to other parts of the body, particularly the bones and lymph nodes (Ruddon, 2007). It may initially cause no symptoms, but in later stages it can cause difficulty urinating, blood in the urine, or pain in the pelvis, back or when urinating (National Cancer Institute, 2015b). Prostate cancer is considered the third most common occurring form of cancer worldwide—about 1.128 million cases, and an estimated 656,000 death in 2012 (Ferlay et al., 2013). It is one of the most common cancers affecting men globally (U.S. Cancer Statistics Working Group, 2009), the sixth leading cause of cancer related death in men, and the eleventh leading cause of death from cancer in all age

groups (Lozano et al., 2012). As cited in (Ahmad et al., 2005); “Prostate cancer is the most common malignant neoplasm among men in United State” (Gerard and Frank-Stromberg, 1998).

In Jordan, prostate cancer is the third most common cancer in the male population, accounting for one third (6.2%) of cancer related deaths and in 2010 alone, 218 (9.4%) new cases were identified (Tarawneh et al., 2010).

Several studies have shown that knowledge, beliefs and intention to screen for prostate cancer among men ages 40 and above are low (Paul et al., 2003; Schulman et al., 2003; Jemal et al., 2007; Weinrich et al., 2007; Chapple et al., 2008; Arafa et al., 2012; Abuadas, 2015). Therefore, researchers conducted a systematic review on different educational interventions to find the most effective ways to improve knowledge, beliefs and intention to screen among men age 40 and over.

This integrative review sought to answer the following research questions: (i) What are the levels of knowledge, beliefs and intention to screen for prostate cancer among

¹Faculty of Nursing, The University of Jordan, ²Faculty of Nursing, Applied Science University, Amman, ³Faculty of Nursing, Al-Gad International Colleges for Applied Medical Sciences, Tabuk, The Kingdom of Saudi Arabia *For correspondence: al_raminy@yahoo.com

men over the age of 40? (ii) What has been the impact of different educational intervention programs on the level of knowledge, beliefs, and intention to screen for prostate cancer among men over the age of 40? (iii) What are the research finding recommendations to enhance prostate cancer knowledge, beliefs and intention to screen for men over the age of 40?

Materials and Methods

Selecting the review topic is the first step in the literature review process followed by identifying relevant publications through searching of the most relevant electronic database after specifying the keywords terms that will be used and the inclusion criteria for articles of interest. The third step in the literature review includes assessing the quality of the studies using critical appraisal and evaluation guides, then we identified the useful and related studies and extracted data by summarizing all selected studies in a literature review matrix after in-depth

reading and comprehension for all studies as presented in Table 1.

A suitable data analysis strategy adopted in order to identify the themes of this paper. Researchers accessed CINAHL, MEDLINE and COCHRANE databases for published studies from January, 2000- April, 2015, using the key words prostate cancer, educational program regarding prostate cancer, knowledge and prostate cancer, factors that affect intention to screen, beliefs, and prostate cancer, and impact of educational program on intention to screen of prostate cancer. Furthermore, current issues of periodicals, major nursing and health journals from worldwide resources were manually reviewed.

Inclusion and exclusion criteria

Research studies (published or unpublished), written in English language and relevance to the topic of knowledge, beliefs, intention to screen for prostate cancer and various educational intervention programs were included. Published work conducted during January, 2000 to April,

Table 1. Methodological Characteristics of the Reviewed Studies

Authors Country/ Year	Purpose	Design	Sample	Results
Knowledge, Beliefs, and Intention to Screen regarding Prostate Cancer				
Knowledge of Prostate Cancer among Men				
Agho and Lewis 2001 USA	To investigate the effects of education, income, age, and health insurance coverage on actual and perceived knowledge of prostate cancer.	descriptive relational study.	nonrandom sample of 108 African American men.	Respondents demonstrated a poor knowledge of prostate cancer and less than 40% reported having had prostate cancer screening as part of their annual physical examination. The results of the study also revealed that (a) there was a moderately strong correlation between actual and perceived knowledge of prostate cancer, (b) use of prostate cancer screening service was positively associated with actual and perceived knowledge of the disease, (c) actual knowledge of prostate cancer was negatively correlated with education, age, and income, and (d) actual and perceived knowledge of prostate cancer were both correlated with having health insurance coverage.
Olufisayo and Sola, 2010 Nigeria	To assess the knowledge, awareness, and screening practices among older men regarding prostate cancer in Oyo State, Nigeria.	cross-sectional study.	561 adult males.	Prostate cancer awareness was high [449 (80.0%)]. The overall mean knowledge of prostate cancer causation, treatment, and prevention was 5.8 (±3.0) out of a maximum of 16. Only 109 (19.4%) perceived themselves at risk of developing prostate cancer, but only 4.5% have ever been screened. Though knowledge and risk perception of prostate cancer were low, a majority of respondents (81.5%) were willing to be screened for the disease. Community-based prostate cancer educational interventions and provision of screening centers are needed for this group.
Ajape et al 2010 Nigeria	To evaluate the awareness and attitude of the population to screening for cancer of the prostate.	Cross-sectional study	156 respondents.	The result shows that 78.8% have never heard any information on cancer of the prostate and only 5.8% have heard about PSA. None of the respondents have ever had PSA test done, 84% of the respondents are ready to pay for prostate cancer test by PSA assay.
Xu et al 2012 USA	To describe prostate cancer treatment decision making, focusing on knowledge and attitudes toward observation.	Pheno-meno-logical study.	Semi structured in-person interviews with 21 men (14 black; 7 white) with recently diagnosed localized prostate cancer.	All cancers were detected by prostate-specific antigen screening; 14 men had low-risk disease. Nineteen chose surgery or radiation treatment. The majority wanted to "get rid of" or "cure" the cancer by undergoing aggressive therapy, even with awareness of the potential for significant side effects. Most men seemed unaware of the uncertainty/controversies that aggressive treatment may not cure their cancer or improve their survival.

Kroger-Jarvis et al. 2014 USA	To evaluate Knowledge of prostate cancer screening rural men in Ripley County, Southeastern Indiana.	Survey.	A convenience sample of 59 men over the age of 50.	Although they indicated knowing updated information regarding prostate cancer screening, many have not obtained screening. Study findings point to the need for educational programs designed to improve prostate cancer screening rates in this population.
Mofolo et al 2015 South Africa	To assess the knowledge of prostate cancer among men attending the urology outpatient clinic at a tertiary hospital in South Africa.	A cross-sectional study.	A total of 346 males, 35 years of age and older.	More than half (54.4%) of the respondents had not heard of prostate cancer. The majority of men who had heard of prostate cancer had a moderate level of knowledge.
Edwards et al 2000 USA	The objectives of this study were to identify, describe, classify, and differentiate African-American men (AAM) in military settings according to the frequency with which they regularly, infrequently, or did not screen for prostate cancer using factors of the Health Belief Model.	An exploratory descriptive study.	Participants in the study included 147 military health care beneficiaries who were AAM 40 years of age and older.	The results revealed that 85% of the men reported having screened for prostate cancer and more than 54% of them reported screening "annually." Discriminant analysis revealed that age, education, and "perceived benefits" of the digital rectal examination and the prostate-specific antigen test best differentiated AAM who screened annually compared with no screeners. Educating AAM on the benefits and efficacy of the digital rectal examination and prostate-specific antigen tests may be helpful in increasing screening practices in this high-risk group.
Clarke-Tasker VA and Wade R 2002 USA	To determine African American male's knowledge, attitudes and perceptions of prostate cancer and early detection methods.	An exploratory descriptive study.	Two focus groups were conducted with African-American men whose ages ranged from 38-80 years.	Men between 40 and 50 years of age expressed concern about possible changes in their sex life if diagnosed with prostate cancer. Despite having limited knowledge of prostate cancer they considered a digital rectal examination to be embarrassing and uncomfortable. However, they were not opposed to having the procedure done.
Forrester-Anderson 2005 USA	The purpose of the study was to explore, using focus groups, the knowledge, perceptions, attitudes, and behavior of African American men concerning prostate cancer and screening for the disease using the prostate specific antigen and the digital rectal examination.	An exploratory descriptive study.	Twelve focus groups (n=104) were conducted among African American men 40 years of age and older.	The results of the study show various barriers to screening among the target population, which include limited knowledge about the disease, lack of access to screening services, embarrassment and fear of a positive diagnosis.
Intention to screen of Prostate Cancer among Men				
Ronald et al 2000 USA	To identify factors associated with intention to be tested for prostate cancer risk among African-American men.	Cross-sectional design.	548 African-American men, who were patients at the University Health Service, were 40 to 70 years of age, and did not have a personal history of prostate cancer.	Results show that belief in the efficacy of prostate cancer screening and intention to undergo a prostate cancer-screening (i.e., digital rectal examination and prostate-specific antigen testing were positively associated with intention to be tested for prostate cancer risk. Past screening, perceived susceptibility, and beliefs related to early detection might influence receptivity to genetic testing for prostate cancer risk.
Gregory et al 2007 USA	To understand men's decision-making process for prostate-specific antigen (PSA) screening, especially among elderly men, and to be more Knowledgeable for interventions to modify screening rates	A cross-sectional design.	Random sample of 452 Iowa men who were free of prostate cancer and aware of PSA	Roughly 75% expressed intent to receive PSA screening within a year. Attitude, social influence, and perceived control each contributed significantly to the explanation of intentions (p<0.001); the model accounted for 72% of the variability in intention. Detecting cancer early, obtaining peace of mind, knowing their PSA value, and false test results were potential outcomes and each convincingly influenced attitude. A man's wife, primary care physician, urologist, family, friends, and people with cancer each visibly swayed overall perceived social influence. The impacts of health insurance, transportation, information, health problems, including PSA in routine exams, and primary care physicians on perceived control was less clear. Elderly men were unaware of the PSA controversy and believed physicians recommend screening men their age.

Table 1 (continued). Methodological Characteristics of the Reviewed Studies

Odedina et al 2008 USA	To identify personal factors influencing African-American men's participation in prostate cancer screening.	Two cross-sectional surveys	191 African-American men age > or =40, married, urban residents, full-time employment status and household income of \$20,000-\$39,000.	The key determinants of intention to undergo prostate cancer screening were attitude, perceived behavioral control, past behavior and perceived susceptibility. Attitude was the primary determinant of screening behavior.
Smith-McLallen et al 2009 USA	to examine differences between Blacks and Whites in the US in the degree to which attitudes, perceived behavioral control (PBC) and normative pressure contribute to predicting intentions to engage in three cancer screenings (mammogram, colonoscopy and PSA test) and three healthy lifestyle behaviors (controlling ones diet to lose weight, eating fruits and vegetables and exercising regularly).	Descriptive design.	African-American men.	Results indicated that for Blacks intentions to engage in all behaviors were driven by PBC. Patterns were more varied for Whites and indicated that normative pressure was a particularly important determinant of screening intentions whereas attitudes were most strongly associated with dieting intentions. Results suggest that interventions targeting these behaviors should be tailored by behavior and by ethnicity.
Carpenter et al 2009 USA	To examines patients' usual source of care, continuity of care, and mistrust of physicians and their association with racial differences in CaP screening.	Descriptive correlational study.	"1,031 African American and Caucasian American men age 50 and over.	Compared with African Americans, Caucasian Americans exhibited higher physician trust scores and a greater likelihood of reporting a physician office as their usual source of care, seeing the same physician at regular medical encounters, and historically utilizing any CaP screening.
Arras-Boyd et al 2009 USA	To measure knowledge of benefits and risks of prostate cancer screening and compare it with a comparison group who did not attend community education and screening events.	A quasi experimental, exploratory study used a pretest/post-test design for men	Sampling was self-selective and consisted of 340 men who attended 24 education and screening events held in 19 locations over a nine-month period.	The reasons for higher incidence and mortality rates from PC in African-American men are complex. Although screening can detect PC in earlier, potentially more treatable stages, there remains controversy over whether or not screening extends or improves quality of life. Until the issue of routine screening is resolved, the best strategy is to offer information about the benefits and risks of screening and to provide access to screening and treatment for men without access to healthcare
Donna Kenerson 2010 USA	To adapt the Theory of Planned Behavior (TPB) to provide a framework for elucidating Sociocultural factors associated with prostate cancer screening intent among African American men.	A correlational, cross-sectional design was used to examine the strength of the relationship between sociocultural variables and the intent to participate in prostate cancer screening among African American men.	Eighty seven African American men 40 to 70 years of age residing in Nashville, Tennessee.	Perceived benefits had a statistically significant correlation ($r=0.285$, $p=0.018$) with prostate cancer screening intent. Social influence was found to be statistically significant associated with intent to screen ($r = .337$, $p =0.005$). Prostate cancer knowledge was not statistically significantly associated with prostate cancer screening intent ($r=0.132$, $p = .279$).
Anderson 2013 USA	To examines prostate cancer screening intention using the health belief model (HBM).	Survey	392 men white and black men aged 40-70 years old living in Davidson County.	First: Age, insurance status, and one income category had significant effects on prostate cancer screening intention. Second: this study suggests the addition of a direct path from the cues to action construct to preventive health behavior as it functions as a trigger or catalyst to the behavior.

Table 1 (continued). Methodological Characteristics of the Reviewed Studies

Knowledge and Beliefs of Prostate Cancer among Men				
Angelo Dewitt Moore and Gerald Boyle 2002 USA	To describe the knowledge base, perceived threats, benefits, barriers, and self-efficacy of prostate cancer screening.	A descriptive design.	A convenience sampling of 234 males in the National Capital Area. Age 52 and older from different sites (Army, Navy, and Air Force) within the NCA.	The majority (93%) of the participants were very knowledgeable about prostate cancer and prostate cancer screening. However, the majority of the study population appeared to be unsure of when to start screening for prostate cancer. All concepts of the HBM (perceived threats, benefits, barriers, and self-efficacy) appear to affect screening patterns as indicated by high mean scores on the perception scales. Two thirds of the participants reported screening annually for prostate cancer.
Blocker et al 2006. USA	To assess attitudes and behaviors linked to prostate cancer prevention activities that could be used to develop a culturally relevant intervention for an African-American church based population.	Qualitative, phenomenological design	The ages of the participants ranged from 34-68 years old. Fourteen African-American men and 15 African-American women participated in the four focus groups.	Three primary themes emerged from the focus group discussions: 1) culturally and gender-influenced beliefs and barriers about cancer prevention and screening; 2) barriers related to the healthcare system; and 3) religious influences, including the importance of spiritual beliefs and church support.
McFall et al 2006. USA	To compare beliefs across three racial/ethnic categories concerning prostate cancer etiology and risk, screening routines, and shared decision-making.	Exploratory, descriptive study.	90 African American participants.	"Few were aware that prostate cancer is asymptomatic in early stages. Confidence in knowledge of screening routines was high, but included misconceptions supporting initiation of screening at earlier ages. Females encouraged screening of male relatives to protect their health. While racial/ethnic groups had similar views and knowledge about screening, African Americans wanted to address the threat of prostate cancer in their communities. Hispanics had awakening awareness of the health risks of prostate cancer. Non-Hispanic Whites were aware of the health threat of prostate cancer. Participants were not aware of controversy about screening.
Chanty et al 2006 USA	To examines the knowledge, attitudes, and beliefs of African-American men and their female significant others regarding prostate cancer screening.	Phenomenological design.	A total of 18 men ages > 40 years and 14 women ages > 30 years participated in the focus group discussions.	The groups expressed multiple apprehensions toward prostate cancer screening, including feelings of vulnerability, compromised manhood, and discomfort. They also shared motivators for screening, including female significant others, physician recommendation, early education, and church influence.
Levi Rosse et al 2007 USA	To evaluate the usefulness of the theory of reasoned action as a model to explain and predict prostate cancer information-seeking behavior by African American men.	A descriptive, repeated cross-sectional research design	Fifty-two African American men, 35 years of age and older, who have never been diagnosed with prostate cancer	Positive behavioral beliefs for obtaining prostate cancer information from physicians included increasing awareness of and obtaining accurate information about the disease, early detection and screening, and treatment. Negative beliefs included fear, distrust, and inconvenience. Significant others, peers, siblings, and religious leaders were identified as individuals who could influence this behavior. These findings provide additional insight into ways to reach and intervene with African American men to influence this important cancer control activity.

Table 1 (continued). Methodological Characteristics of the Reviewed Studies

Elenir Pereira de Paiva, et al 2009 Brazil	“To analyze knowledge attitudes and practices towards prostate cancer in men aged from 50 and 80 ascribed to a unit of the Family Health Program in Juiz de Fora municipal district - MG.	A sectional study.	a simple random sample of 160 men of 457 men of an ascribed area to a PSF of Juiz de Fora County, MG.	The majority of participants had knowledge about detection of prostate cancer. Great number of them had attitudes and engaged in adequate practice for the detection of prostate cancer.
Mostafa A Arafa, Danny Rabah and Iman Wahdan 2012 Saudi Arabia and Jordan	Exploring the knowledge and beliefs of men aged forty years and over towards prostate cancer screening and early detection in three Arab countries.	A comparative cross sectional study.	400 subjects.	They had poor knowledge and fair attitude towards prostate cancer screening behavior, where the mean total knowledge score was 10.25 ± 2.5 , 10.76 ± 3.39 and 11.24 ± 3.39 whereas the mean total attitude score was 18.3 ± 4.08 , 20.68 ± 6.4 and 17.96 ± 5.3 for Saudi Arabia, Egypt and Jordan respectively.
H. Nakandi et al 2013 Kampala	To assess the current knowledge, attitudes and practices of adult Ugandan men regarding prostate cancer.	A descriptive cross-sectional study.	545 adult men aged 18–71 years, residing in Kampala, the capital of Uganda.	There was generally poor knowledge and several misconceptions regarding prostate cancer and screening in the study population.
Fariba et al 2014 Iran	To investigate the level of knowledge and health beliefs about prostate cancer screening among retired men.	Descriptive study.	180 men aged 50-70 years who were retired from Shiraz Education Department.	Findings showed that 95.6% and 85.6% of the interviewees had no experience of digital rectal examination (DRE) and prostatic-specific-antigen (PSA) testing for prostate cancer screening, respectively. 86.1% of men had no knowledge about such screening. 74.4% and 90.5% of them had good health motivation and perceived benefits scores, respectively. 81.6% of them revealed intermediate scores for perceived barriers. Moreover, 32.7% and 7.2% of the subjects reported good severity and susceptibility scores, respectively.
Knowledge, Beliefs and Intention to Screen of Prostate Cancer among Men				
Wanyagah et al 2013 Kenya	To evaluate the awareness and knowledge levels; perception of prostate cancer self-vulnerability and uptake of prostate cancer screening in Nairobi County.	Cross-sectional descriptive study.	Men (n=581) of age 30-73 years.	The results of this study demonstrate higher awareness but low knowledge levels on prostate cancer that are accompanied by low perceptions on self-vulnerability to the cancer, low uptake of prostate cancer screening that parallel poor knowledge and perceptions on prostate cancer self-vulnerability and uptake of screening. Thus, public health intervention targeting information dissemination on prostate cancer; behavioral change on risk perceptions; and uptake of early screening of prostate cancer can halt the increasing burden of the disease.
Abuadas 2015 Jordan	To investigate the level of knowledge and health beliefs and intention to screen about prostate cancer among older Jordanian men in Amman.	Descriptive Correlational study.	Jordanian older adults, aged 40 years and over, who visited a comprehensive health care center within a ministry of health.	The level of Knowledge, Beliefs, and intention to screen among Jordanian older adult men are low, which indicate the important to provide health education program to them
The impact of educational intervention programs on the level of knowledge, beliefs, intention to screen for prostate cancer				
The Impact of Different Educational Programs on the Level of Knowledge				
Taylor et al 2001 USA	To develop and evaluate health education materials designed to help African American men make an informed decision about prostate cancer screening.	Eight focus groups, Phenomenological study.	Eight focus groups with 44 members of the Prince Hall Masons.	Participants demonstrated a high level of awareness of the availability of prostate cancer screening, a low knowledge of the screening controversy, and a desire for detailed epidemiologic information and information about the benefits and limitations of screening. The preferred forms of educational materials were video and print-based materials.
Frosch et al 2003 USA	To compare the clinical effectiveness of an internet-based decision aid with a video for educating men about issues relevant to PSA screening.	A pre- and posttest 2-group design.	226 men, aged 50 years or older.	Participants in the video group showed significantly greater increases in prostate specific antigen knowledge and were more likely to decline the PSA test than individuals assigned to the internet group.

Table 1 (continued). Methodological Characteristics of the Reviewed Studies

Wilkinson et al 2003	To determine whether an education program on prostate cancer could improve awareness and knowledge among African-American men.	A pre- and posttest 1-group design.	900 African-American adults attending prostate cancer education seminars in community settings throughout Illinois between March 1998 and January 2001.	The mean survey score improved from 26.0% before the seminar to 73.3% after it ($P < 0.0001$). Every multiple-choice question was answered correctly more often after the seminar than before it. Increasing levels of education and income were associated with higher before and after scores ($P < 0.001$). Men achieved a significantly greater score improvement (mean 48.1%) compared with women (mean 41.1%; $P = 0.006$).
Ruthman and Ferrans 2003 USA	To test the effectiveness of a video to teach patients about prostate cancer screening and treatment in a clinic setting.	A staged, two-group, pretest-posttest quasi-experimental design was used.	Subjects were men ($n = 104$) who. Inclusion criteria were the following: male, ages 50 to 80 years, scheduled for a routine appointment, no known prostate cancer, and no history of PSA greater than 4.0 ng/ml.	Knowledge increased significantly from pretest to posttest for the experimental group, but not for the control group ($p < .001$). More patients in the experimental group changed their preference for prostate-specific antigen (PSA) screening (31% experimental vs. 2% control, $p = .002$).
Gattellari and Ward 2005 Australia	To facilitate informed decisions about prostate cancer screening.	Randomised controlled trials.	421 men recruited from the community.	Men in all three groups demonstrated significant increases in knowledge scores from pre to post-test. Men require detailed information about the pros and cons of PSA screening in order to make an informed decision.
Taylor 2006 USA	To determine the effect of the interventions on knowledge, decisional conflict, satisfaction with the screening decision, and self-reported screening.	Randomized trial.	238 African American men.	The booklet and video resulted in a significant improvement in knowledge and a reduction in decisional conflict about prostate cancer screening, relative to the wait list control. Satisfaction with the screening decision was not affected by the interventions. Self-reported screening rates increased between the baseline and the 1-year assessment.
The Impact of Different Educational Programs on the Level of Knowledge and Beliefs				
Baqar 2008 USA	“To evaluate an educational intervention program with a culturally tailored curriculum based on a peer education model.	a quasi-experimental delayed control (crossover) design	A convenience sample of 430 African American male volunteers (ages 40–70) was enrolled through the churches	Within each group, knowledge, perceived threat, and screening prevalence all increased significantly.
Caryn 2009 USA	Examine the efficacy of a brief digital video intervention on levels of knowledge and perceived individual risk of developing prostate cancer for men of average risk.	Quazi Experimental design, Pre- test/ post- test.	123 Caucasian men, ages 45 to 75 years.	Men scored significantly higher on a knowledge questionnaire and were significantly more likely to rate their personal risk of developing prostate cancer correctly after watching the video.
Capik and Gozum 2012 Turkey	To investigate the effect of web-assisted education and reminders on health belief, level of knowledge and early diagnosis behaviors regarding prostate cancer screening.	A single group longitudinal design	A total of 1744 persons above 40 years of age who worked in two public institutions.	“participants’ prostate examination rate increased from 9.3% to 19.1% and PSA measurement rate increased from 6.7% to 31.4%. The interventions raised the susceptibility perception on prostate cancer and prostate cancer screening while decreasing the barrier perception ($P < 0.05$). No change was observed in other health belief components and the level of knowledge.

Table 1 (continued). Methodological Characteristics of the Reviewed Studies

The Impact of Different Educational Programs on the Level of Knowledge and Beliefs and Intention to Screen				
Nnodimele et al 2010 Nigeria	To measure the level of awareness, specific knowledge, perception and screening behavior of prostate cancer among males.	A cross-sectional design	"398 men aged between 30 and 72 years were enrolled for the study by systematic random selection.	The findings suggest that level of awareness about prostate cancer among men in this study was low while their level of perception was just above average and screening behavior was very low. Again, perception variables positively and significantly correlated with screening behaviour among the participants.
Bettina et al 2010 UK	"To: (1) increase knowledge about prostate cancer (CaP) screening; and (2) promote self-efficacy to participate in the informed decision-making (IDM) process.	A quasi experimental, pretest-posttest design was used to assess the impact of the intervention.	73 convenience sample of men were recruited through seven different churches.1) self-identified as African-American; 2) between the ages of 40 and 70; and 3) had never been diagnosed with prostate cancer.	The main outcome measures were change in knowledge and self-efficacy post intervention. Cancer prostate knowledge (p<0.0001) and self-efficacy (p=0.025) significantly increased.
The Impact of Different Educational Programs on the Level of Knowledge and Intention to Screen				
Melissa Partin et al 2004 USA	"To assess the effect of video and pamphlet interventions on patient prostate cancer (CaP) screening knowledge, Decision-making participation, preferences, and behaviors.	Randomized, controlled trial.	1152 male veterans age 50 and older were randomized and 893 completed follow-up.	The results suggest that both interventions evaluated modestly enhance patient CaP screening knowledge and self-reported participation in decision making, and decrease interest in screening relative to controls.
Flora et al 2013 USA	The main purpose of the study is to test the feasibility and acceptability of a culturally appropriate PCa education intervention among low-income African Americans.	"A single-group non-randomized education intervention study	539 low-income African American men aged 42 years and older, who did not screen for PCa in the past 12 months.	Mean knowledge score of 21 points increased from 13.27+-3.51 to 14.95+-4.14 (p<.001), and prostate-specific antigen screening from 22.1% to 62.8%.
Folakemi et al 2014 USA	To explore the impact of the W.O.R.D video on the following variables: CaP knowledge, CaP screening intention, and decisional conflict.	A quasi experimental, a pre-, post-test research design	142 black men, age 35 and above, regardless of CaP history. Men who were not black men of African ancestry and who were unable to speak English were excluded from participating in the study.	The mean pre-test knowledge score was 63.6%, and the mean post-test knowledge score after intervention exposure was 74.0%., while the baseline score of participants on the intention scale was high, the intervention exposure slightly increased the mean score of participants on this scale. The number of uncertainty factors perceived by participants decreased slightly after watching the W.O.R.D video.

2015, using quantitative, qualitative, mixed methods and systematic reviews were included. Prostate cancer studies from hospitals, clinics, and community surveys for men over the age 40 were also considered for this review. All the studies that did not match the inclusion criteria were excluded.

Results

As part of the methodological analysis researchers examined study characteristics for country of origin,

purpose, sample, study design, theoretical framework and the applied instrument. A total of 123 full-text articles were retrieved (Figure 1), titles were screened for relevance and abstracts were read carefully. All the studies that did not match the inclusion criteria were excluded. After careful review of the articles contents and relevance to the objectives of this study, 42 articles were selected according to the inclusion criteria and others that did not match were omitted.

After screening 123 published research studies on the

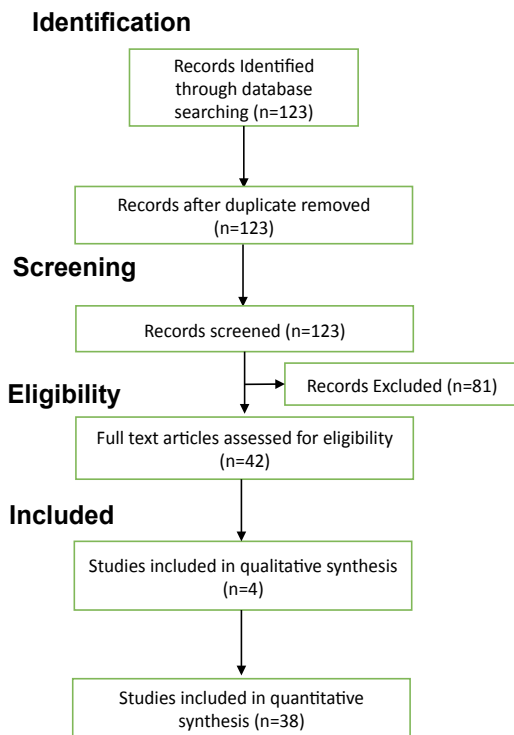


Fig 1 | Search strategy to identify studies regarding Knowledge, Beliefs, and Intention to Screen in addition to different health educational interventions for prostate cancer.

Figure 1. Search Strategy to Identify Studies Regarding Knowledge, Beliefs, and Intention to Screen in Addition to Different Health Educational Interventions for Prostate Cancer

knowledge, beliefs and intention to screen for prostate cancer, we chose 42 articles for our systematic literature review and tabulated our findings from the selected empirical studies that included men between the ages of 18-80 years, used various instruments with established validity and reliability scales, questionnaires and educational interventions to enhance knowledge, beliefs, and intention to screen for prostate cancer.

Except for four qualitative study, others were quantitative research and mainly published in cancer related journals. Most of the selected studies used descriptive, interventional and some correlational methods with quasi experimental and few were randomized clinical trials (RCTs).

Intention to screen for prostate cancer has been investigated in different ways and with different study designs. All studies aimed at several issues related to significance of knowledge and beliefs on intention to screen for prostate cancer, impact of different health educational Interventions on enhancing men's knowledge and beliefs and its affect on the intention to screen for prostate cancer was also addressed in the studies. Some of the studies aimed to assess the knowledge, awareness, and screening practices among older men regarding prostate cancer, other studies investigated the relationship between the Impact of different educational programs on the level of knowledge, beliefs and on intention to screen for prostate cancer. Participants of the majority of the

studies were older adults men, aged 40 years and over. The selected empirical studies included various valid and reliable scales and questionnaires which measured several issues related to intention to screen for prostate cancer.

Discussion

Knowledge, beliefs, and intention to screen regarding prostate cancer

Reviewed findings from selected literature on the overall concepts of knowledge, beliefs, and intension to screen for prostate cancer, identified men ages 40 and above with limited knowledge, beliefs and intention to screen for prostate cancer. In Nigeria, a study by Ajape et al., (2010) to evaluate the awareness and attitude of the population regarding screening for cancer of the prostate, the result shows that 78.8% have never heard any information on cancer of the prostate and only 5.8% have heard about PSA, this result was congruent with another study by (Mofolo et al., 2015) in south Africa which revealed that more than half (54.4%) of the respondents had not heard of prostate cancer; the majority of men who had heard of prostate cancer had a moderate level of knowledge.

Studies in United States indicated that attitude patterns changed for all cancer screening modalities based on age, gender, racial and ethnic backgrounds. However, "recommended screening intervals" was consistently lower among the less educated men, which attributed to less knowledge about prostate cancer (Breen et al., 2001; Paiva et al., 2009; Kroger-Jarvis, 2014). Similarly, researchers in the United States, found that exposure to information on prostate cancer positively predicted participation in cancer screening (Nivens et al., 2001).

Agho and Lewis (2001) reported that among 108 African-American men, there was a statistically significant relationship between perceived knowledge about prostate cancer and participation in screening ($r=0.55$, $p 0.001$).

In addition to knowledge impact on intention to screen prostate cancer, health beliefs are important factors. Myers et al. (2000) found that among 548 African-American men ages 40-70 years there was a positive relationship in their health beliefs about prostate cancer screening, screening rates and treatment.

Using factors of the Health Belief Model, a study was conducted to identify, describe, classify, and differentiate African-American men (AAM) in military settings according to the frequency with which they regularly, infrequently, or did not screen for prostate cancer, the discriminant analysis statistics revealed that age, education, and "perceived benefits" of the digital rectal examination and the prostate-specific antigen test best differentiated AAM who screened annually compared with no screeners. Educating AAM on the benefits and efficacy of the digital rectal examination and prostate-specific antigen tests may be helpful in increasing screening practices in this high-risk group (Edwards et al., 2000).

Health belief model was also used to examine prostate cancer screening intention; Age, insurance status, and one income category had significant effects on prostate cancer screening intention (Moore and Boyle, 2003; Anderson,

2013).

In United States, a study was conducted to explore the knowledge, perceptions, attitudes, and behavior of African American men concerning prostate cancer and screening for the disease using the prostate specific antigen and the digital rectal examination showed various barriers to screening among the target population, which include limited knowledge about the disease, lack of access to screening services, embarrassment and fear of a positive diagnosis (Forrester-Anderson, 2005).

The same barriers were founded by a study conducted in USA, entitle "What we thought we knew: African American males' perceptions of prostate cancer and screening methods" to determine African American male's knowledge, attitudes and perceptions of prostate cancer and early detection methods, findings revealed that men between 40 and 50 years of age have limited knowledge of prostate cancer and they belief that the digital rectal examination to be embarrassing and uncomfortable procedure. However, they were not opposed to having the procedure done (Clarke-Tasker and Wade, 2002).

From global perspective on the overall concepts of knowledge, beliefs and intention to screen for prostate cancer a study findings showed that although older Nigerian men had high rates of general awareness about prostate cancer, their specific knowledge regarding etiology, treatment, prevention, risk perception, and screening were low (Oladimeji et al., 2010). Furthermore, in a recent study among Indian patients Xu et al. (2012) indicated that most men were unaware of treatment options and the outcomes for prostate cancer.

In three Arab countries; Saudi Arabia, Egypt and Jordan, Arafa et al. (2012) explored the knowledge and beliefs of men ages 40 and over towards prostate cancer screening and early detection; the results revealed that men had poor knowledge and fair attitude towards prostate cancer screening behavior, with a Mean total knowledge score of 10.25 ± 2.5 , 10.76 ± 3.39 and 11.24 ± 3.39 and the mean total attitude score of 18.3 ± 4.08 , 20.68 ± 6.4 and 17.96 ± 5.3 in Saudi Arabia, Egypt and Jordan respectively. In a more recent studies were conducted in Jordan, Abuadas (2015), among older Jordanian men showed that most men had low levels of knowledge, beliefs, and intention to screen for prostate cancer. Ahmad et al. (2014) indicated that knowledge gaps and improper practices toward cancer existed among the participants and, if corrected, could improve the care, prevention, and early detection of cancer, this finding was consistent with Ahmad (2015) study findings, which aimed to explore knowledge and beliefs toward cancer in Jordan. Also, (Petro-Nustus and Mikhail, 2002) result showed that having heard or read about cancer found to be significant predictors of screening practice.

When the review focus was narrowed on the intention to screen, Smith-McLallen and Fishbein (2009) observed that African American men who had high levels of perceived behavioral control were more likely to have higher intentions to engage in prostate cancer screening and prostate specific antigen (PSA) test. Whereas, Odedina et al., (2008) indicated attitude was a strong determinant for African-American men to have an intention to screen

for prostate cancer. Gregory (2007) showed that 75% expressed intent to receive PSA screening within a year. Attitude, social influence, and perceived control each contributed significantly to the explanation of intentions, these findings were consistent with (Kenerson, 2010) study. Also, in earlier reviews intrapersonal and interpersonal factors were associated with men receiving prostate cancer screening (Carpenter et al., 2009; Drake et al., 2010)

Intention to screen can serve as bridge that permits the intrapersonal variables to be associated with prostate cancer screening. For example, one study suggested that being married is associated with a higher degree of intention (Blocker et al., 2006; Webb et al., 2006). Such intention, in turn, influenced the likelihood of prostate cancer screening among the more educated men (e.g., better knowledge and resources) as impetus for prostate cancer screening (Drake et al., 2010) and African American men feeling adequately prepared to navigate the health care system in order to have prostate cancer screening (Ross et al., 2007; Arras-Boyd et al., 2009). Thus, a high level of intention is closely associated with a higher likelihood of an individual behaving in a particular way (Ajzen, 2006)

Other studies proved that there was generally poor knowledge and several misconceptions regarding prostate cancer and screening intention, The level of Knowledge, Beliefs, and intention to screen among older adult men are low, which indicate the important to provide health education program to them (McFall et al., 2006; Arras-Boyd et al., 2009; Atulomah et al., 2010; Nakandi et al., 2013; Wanyagah, 2013; Ghodsbin et al., 2014; Abuadas, 2015).

Understanding the perception and knowledge about screening and early detection of cancer is essential to design culturally appropriate and age-appropriate health promotion campaigns and services (Dasoqi et al., 2013).

For the purpose of this systematic review, one may conclude that intention can influence behavior and it is likely that positive intentions can lead to Jordanian men seeking prostate cancer screening, therefore, intention to screen can be a motivating factor for prostate cancer screening of men with low knowledge level and beliefs regarding prostate cancer. Hence, an educational intervention would be prudent and necessary to accomplish this task.

In summary, the previous literature has clearly identified a significance relationship between knowledge and beliefs on intention to screen for prostate cancer. Intention to screen can serve as bridge that permits the intrapersonal variables to be associated with prostate cancer screening and early detecting.

The impact of educational intervention programs on the level of knowledge, beliefs, intention to screen for prostate cancer

On the topic of educational intervention most of the studies were from United States and African-American men. Wilkinson et al. (2003) determined whether a culturally relevant educational program on prostate cancer would enhance knowledge among 835 African-American men and found significant improvements from baseline

as shown in their post-seminar scores assessing prostate cancer knowledge level.

In a quasi-experimental study, Ruthman and Ferrans (2004) tested the effectiveness of a video to teach patients about prostate cancer screening and treatment in a clinical setting and found significant knowledge increase from pretest to posttest among the experimental group and no change in the control group ($p < 0.001$). Researchers noted that patients in the experimental group changed their preference for PSA screening (31% experimental vs. 2% control, $p = 0.002$), indicating that patients were influenced by the presented information. Moreover, Taylor et al., (2006) conducted a randomized intervention study on African American men between the ages of 40-70 and determined the effectiveness of two interventions as a printed booklet and a videotape on prostate cancer screening and having conflict with making a decision. The booklet and video significantly improved knowledge and reduced decisional conflict in the experimental group compared to the control group who exhibited a delayed decision making pattern. Frosch et al. (2003) and Taylor et al. (2001) indicated that the preferred forms of educational materials were video and print-based materials and introducing an education program play a significant role to enhance men knowledge and their intent to screen prostate cancer, these results were consistent with others study results (Partin et al., 2004; Capik and Gozum, 2012; Odedina et al., 2014), As well as the conclusion of (Petro-Nustas et al., 2013) Proper education is important in shaping attitudes and beliefs.

To facilitate informed decisions about prostate cancer screening, a randomized controlled trial of three different educational resources for men about prostate cancer screening was conducted by Gattellari and Ward (2005) to 421 men recruited from the Australian community; results showed men in all three groups demonstrated significant increases in knowledge scores from pre to post-test. Men require detailed information about the pros and cons of PSA screening in order to make an informed decision.

Khalil and Abdalrahim (2014) concluded that improvement in population understanding about chronic disease is needed to increase their awareness and practices to make appropriate and effective decisions towards health promotion and better quality of life.

On the same topic, a study conducted in USA, Sheehan (2009) examined the efficacy of a brief digital video intervention on the knowledge and individual risk perceptions for developing prostate cancer among 123 Caucasian men, ages 45-75 years. Men scored significantly higher on a knowledge questionnaire and able to more accurately rate their personal risk after watching the video. Also, a greater number of men showed intention to discuss prostate cancer screening with their primary care provider post-intervention. Moreover, researcher demonstrated an effective and time-efficient educational nursing intervention video for educating men about prostate cancer and prostate cancer screening.

A study by Husaini et al. (2008) assessed the impact of a church based educational program, which included a video, pamphlets, and a question-and-answer session on prostate cancer screening for 430 African American male

volunteers (ages 40-70). The findings revealed that a low-cost prostate cancer awareness campaign within a church may be enough to affect prostate cancer knowledge, beliefs, and behaviors among African American men.

A recent study, Ukoli et al. (2013) observed the impact of tailored prostate cancer education on knowledge and screening among 539 low-income African Americans men and found that 15-minutes education interventions (providing a prostate cancer brochure and tailored interaction) led to improved knowledge, beliefs, and action. Furthermore, researchers showed that a balanced educational intervention on the risks and benefits of prostate cancer screening helped provide a platform for participants to make informed decisions and dramatically increased PSA testing, among men who did not have access to regular physical examinations.

In conclusion, educational intervention programs were found in literature to increase perceptions, knowledge, beliefs and intent to screen prostate cancer which has a direct effect on improving healthcare outcomes.

Information Gaps in Literature: Systematic review and analysis of selected research literatures showed that majority of researchers were interested in the knowledge, beliefs, and intention to screen for prostate cancer and their results unanimously supported the use of an effective and dynamic educational intervention as a fundamental requisite for prevention and early detection of prostate cancer. Also, we found congruence and no contrast in literature among the researchers using quasi-experimental design, and in four studies of a qualitative approach. Therefore, unavailable qualitative research may limit the richness of details.

Further studies using different designs to implement educational programs could perhaps identify the needs and priorities of the target population. According to published studies (Arafa et al., 2012; Abuadas, 2015), In Jordan, adult males have low knowledge levels, beliefs, and intention to screen for prostate cancer. Thus, we recommend focusing on educational interventions to enhance knowledge, beliefs, and intention to screen for prostate cancer among the Jordanian men.

Relevance to Clinical Practice: Enhanced knowledge, beliefs, and intention to screen for prostate cancer through different educational materials is an important clinical practice issue. There is a need for targeted educational materials, particularly materials that are balanced in terms of risks and benefits of early screening. Improved knowledge would produce corresponding improvement in screening, knowledge and beliefs to serve as an important preventive approach for life threatening health issues such as prostate cancer. Literature supports that educated and informed men, seek screening for early detection of prostate cancer.

Future Directions and Recommendations: The studies finding support that the use of constant, persistent, and dynamic educational activities are a fundamental requisite for the prevention and early detection of prostate cancer. Although there is no empirical evidence as of yet that prostate cancer screening reduces mortality, screening may be beneficial for men at increased risk for prostate cancer, such as African American men (Harris et al., 2004).

Furthermore, a church-based intervention delivered by a health educator is a promising strategy for promoting knowledge and beliefs among men (Drake et al., 2010). Therefore, More rigorous study designs (e.g. longitudinal studies, RCT's) are needed to further test this intervention strategy. More research is needed to examine the extent to which gaining knowledge and beliefs improve intention to screen for better outcomes. Assessment of psychosocial factors among different ethnic groups may facilitate the decision making processes (e.g., spiritual or religious beliefs). In addition, developing an assessment strategy based on the health belief model (HBM) seems appropriate for designing and effectively implementing an educational program for men in Jordan.

Limitation: In this systematic review of literature, we found four qualitative research design, which may limit the richness of details on knowledge, beliefs and intention to screen for prostate cancer.

Conclusions: We conclude that in order to stimulate regular screening among men, healthcare providers and researchers should design an effective health promotion plan and educational intervention program to increase awareness and to correct false impressions about prostate cancer in Jordan. The needs assessment of communities based on the health belief model (HBM) could be the first effective approach to design and implement an educational program for any target population. Educational programs should be designed so that public misperceptions are identified and corrected, in order for the individuals recognize health concerns and gain more knowledge. Furthermore, we found that educational video are significantly effective educate and motivate participants about the benefits of PSA screening for early detection of prostate cancer.

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