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REVIEWS

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The impact of socioeconomic status on prostate cancer screening and access to medical care

SEYED SAEED TAMEHRI ZADEH[1, E], AMIRREZA NABIGHADIM[2, B], ALI MOHAMMAD FAKHR YASSERI[1, C], SEYED MOHAMMAD KAZEM AGHAMIR[1, A]
ORCID ID: 0000-0003-1611-0362

[1] Urology Research Centre, Tehran University of Medical Sciences, Tehran, Iran
[2] Paediatric Urology and Regenerative Medicine Research Centre, Children's Medical Centre, Tehran University of Medical Sciences, Tehran, Iran

A – Study Design, **B** – Data Collection, **C** – Statistical Analysis, **D** – Data Interpretation, **E** – Manuscript Preparation, **F** – Literature Search, **G** – Funds Collection

Summary Nowadays, Prostate Cancer (PC) makes up a high proportion of cancer mortality; moreover, apart from skin cancer, it has the most prevalence among malignancies. Due to tremendous progress in early detection through blood tests, surgical procedures and radiotherapy treatment, the prognosis of patients with PC has been dramatically increased. Over the past years, an ongoing debate on the costs and benefits of early detection of PC has existed, and the overall value of early detection in PC remains to be elucidated. The clinical implication of Prostate-Specific Antigen (PSA) in PC diagnosis has been proven to some degree and has been considered the leading cause of the notable rise in PC incidence. In a scrutiny of literature, plenty of studies have been conducted regarding the effects of socioeconomic status (SES) on different aspects of PC. The index of SES involves a combination of different indicators including, but not limited to, education, lifestyle and economy. According to the outcomes of previous investigations, the level of SES is inversely correlated with the PC mortality rate, resulting in the detection of the tumour in the earlier stages. In support of this fact, men with higher levels of SES have more access to medical care; furthermore, as the level of SES increases, the intention toward PSA screening tests rises.

Key words: social class, prostatic neoplasms, prostate-specific antigen, mass screening, costs and cost analysis.

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Background

Currently, one out of nine men older than 65 of age is diagnosed with prostate cancer (PC), and this has become the most prevalent cancer among men in the United States [1]. Due to tremendous progress in early detection through blood tests, surgical procedures and radiotherapy treatment, the prognosis of patients with PC has dramatically increased. Despite this remarkable success, given the absence of proper therapeutic strategies, the outcome of patients with advanced PC has not been satisfactory [2]. Undoubtedly, a late PC diagnosis results in deteriorated prognosis, necessitating its early detection as being crucial [3]. The primary tool for early diagnosis of PC is PSA. In addition, most evidence supports its applicability, appreciating the utilisation of PSA [4].

The relationships between social determinants, in particular socioeconomic status (SES) and PSA screening tests, PC incidence and morality have been at the centre of focus of a number of studies over the last two decades [5]. Recent studies stated that patients with higher SES are more willing to undergo early PSA tests than patients with lower SES [6, 7], resulting in an enhancement in the surveillance of patients and a decrease in the chance of tumour progression [8]. There is a lot of evidence to support the fact that SES can affect the incidence of PC. It is expected that those with higher SES tend to have a higher incidence of PC [9] and lower mortality rate [10] compared to those with lower SES. This narrative review aimed to discuss the relationship between early detection, incidence and morality of PC and SES.

Prostate cancer

The incidence of PC has been rising rapidly over time, and it has surpassed lung cancer, which once was the most common cancer in men [11]. The substantial rise in the incidence of PC has been attributed to the broad utilisation of PSA as a diagnostic tool [12]. Even though the incidence of PC has increased, due to the significant improvements in treatment modalities, the increment of awareness towards the importance of PC early detection and decrease of PC aggressiveness and its mortality rate has diminished.

1. Significant improvements have occurred in treatment modalities.
2. Awareness of the importance of early detection of PC has increased.
3. The aggressiveness of PC has decreased; however, there is a shortage of evidence, making this inconsistent with this theory [3].

There is no consensus on the impact of the PSA screening test on the mortality rate of PC. It is not apparent whether the introduction of the PSA test accounts for the increase in mortality rate or not. Following the study performed in Los Angeles, the mortality rate of PC did not virtually change after the introduction of the PSA test compared to before the introduction of the test. Therefore, PSA may not significantly affect the PC mortality trend [13].

Early detection

Over the past few years, an ongoing debate on the costs and benefits of early detection of PC has existed, and the overall

value of early detection in PC remains to be elucidated. Prior to performing PSA, evaluation of the advantages and disadvantages of the test as a screening test is necessary. It has been postulated that many men who were undergoing various treatments due to abnormal PSA test results might never have experienced any treatment-induced consequences and complications if they had not undergone the screening test [3, 14, 15].

In 2010, the guideline for early detection of PC was published, in which the first inclusion criteria for screening tests was a life expectancy of up to 10 years, and in this case, the patients should be informed about PSA-related merits and shortcomings [3, 16]. Men of average risk, African American men with a family history of PC in first-degree relatives before the age of 65 and the men with several cases of PC in their family diagnosed before 65 years of age should be informed of their risk at the age of 40, 45 and 50; respectively [17]. According to most studies, screening for PSA should be continued until the age of 70 years, and some suggest that based on patient desire, it could be continued until the age of 75 [18–20]. A study showed that the benefits of screening with PSA are restricted to men aged 55 to 69 [21]. Taken together, there is no exact age for stopping screening with PSA following recent studies.

Socioeconomic status

SES was developed to categorise people into different groups based on their education, lifestyle, environment and economic opportunity. Different behaviours are expected between high SES and low SES individuals. For instance, because of a great tendency to high-risk behaviours like smoking and overconsumption of alcohol, it is more likely to detect several cancers and heart and pulmonary diseases in a person with high SES [22–24].

Socioeconomic status and prostate cancer incidence

Since PSA was introduced as a screening test for PC, it was hypothesised that PSA might influence the correlation between SES and PC incidence. It was shown in a study by Lihua Liu et al. that once the PSA screening test became widespread in 1987, a positive correlation between SES and PC incidence was seen in all ethnic groups other than Asians. This positive relationship was found after 1995 in the Asian group. They claimed that a positive correlation between SES and PC incidence and the subsequent wide usage of PSA screening demonstrated that this test was utilised worldwide irrespective of ethnic group or race and contributes to a notable rise in PC incidence [13].

A number of studies have examined the correlation between SES and PC incidence [5]. The findings of the studies were inconsistent, and they have found positive associations [25], negative associations [26] or no associations [27] between PC incidence and SES. A population-based cross-sectional study among Americans, Hispanics, Asian/Pacific Islanders and non-Hispanic Whites revealed that higher levels of SES were associated with higher PC incident (relative risk = 1.28 [1.25–1.30]). The highest incidence rates of PC belonged to African Americans and Hispanics aged 45–64 and 75–84 years, respectively [28]. Hastert et al. evaluated the association between PC incidence and area-level SES utilising data from the Vitamins and Lifestyle cohort study. The authors reached a weak association between lower area-level SES and lower PC incidence [29]. Tomic et al. performed a study among those with PC registered in the National Prostate Cancer Register of Sweden to assess the role of SES in PC diagnosis, treatment and mortality. The investigators found out that those with high SES had a higher chance of PC being detected in a health-check-up, a lower chance of waiting more than 3 months for surgery, a higher chance of curative treatment for intermediate- and high-risk PC and a lower risk of margin involvement [30].

Socioeconomic status and prostate cancer mortality

The combination of varying mortality rates among different racial groups and the varying SES among different racial groups provoke much interest when studying the relationship between PC mortality rate and SES. A racial difference concerning the morality rate of PC is present. Africans Americans have the highest incidence rate and mortality rate, resulting from having a higher chance of presenting with the late-stage disease. The shortage in performing PSA screening tests, the reasons for which include SES, demographic characteristics and comorbidities, is the primary reason for explaining the diagnosis of advanced-stage PC in African Americans. Hormonal and molecular factors may be the cause of tumour advancement at the time of diagnosis in African Americans [31, 32].

With the growth of indications, the idea that individuals with higher SES have lower PC mortality rates compared to individuals with lower SES is gaining popularity. Several studies emphasised that if patients with PC have higher SES, higher surveillance will be expected. Cheng et al. demonstrated that in patients with PC, as the level of SES increases, the mortality rate decreases, and patients with higher levels of SES have better access to medical services such as PSA screening tests, chemotherapy regimens and radiotherapy treatment. In addition to better access to medical services, patients with a higher level of SES possess more knowledge about health information [28, 33]. Freeman et. al designed a cohort study to evaluate the prognostic significance of census tract-level SES among non-Hispanic and African American men suffering from PC. Census tract-level SES was associated with a significant enhanced risk of PC-related death (highest vs lowest quartile, HR = 2.3) [34]. A study using the data of the National Prostate Cancer Register of Sweden found a lower significant risk of mortality for those with localised high-risk and metastatic PC and for those without any comorbidities [30]. Kilpeläinen et al. investigated the association between SES and PC incidence and mortality among 72,139 participants from the Finnish Randomised Study of Screening. During a median follow-up of 12.7 years, they detected a significant association between higher SES and higher low- to moderate-risk PC incident and a lower probability of advanced PC. Those with higher education had a lower likelihood of mortality from PC in control and screening candidates. Moreover, those with higher income had a lower probability of mortality from PC only in the control group [35].

As we know, individuals with a high level of SES are frequently more educated than those with a low level of SES. The magnitude of the relationship between education and mortality rate in patients who present with distant metastasis is not as significant as the relationship in those who present with regional tumours. To treat localised prostate tumours, the best treatment is not yet precise. The quality of care in those with low SES is not as high as in those with high SES, regardless of what treatment is provided to the patients [4, 36].

Socioeconomic status and PSA screening test

Considering PSA as a test for early PC detection has been very challenging. Consequently, according to the recommendation of the American Urological Association, before applying PSA exams in men with no clinical symptoms, they should be aware of sufficient information about the risks and benefits of the test to assist them in making screening decisions [37, 38]. Several studies have repeatedly established that SES can influence both access and use of PSA screening tests, in which men with higher SES have easier access and have undergone PSA tests much more than those with low SES [39–41].

The effect of education as part of SES on men's knowledge about PSA screening tests has been investigated. Engaging patients in screening decisions necessitates the doctors being

informed about patients' knowledge of PSA screening tests. A study states that African Americans fear death from PC and do not intend to be screened [42]. In another study, this point was highlighted as well. Nevertheless, the authors suggested that fear of death is not restricted to African Americans. They also pointed out that education has a positive association with knowledge of PC screening tests, and the previous knowledge of patients with low education should be corrected [43]. A study in Nigeria showed that despite a high knowledge of PC among public servants, only a few of them had undergone PSA screening tests, highlighting the major role of health authorities in early detection of PC utilising PSA tests [44]. Kangmennaang et al. designed a study to understand the factor(s) preventing men 40–64 years of age from undergoing PSA screening in Namibia. The authors found that health insurance coverage, higher education and discussing reproductive issues with a health workers had the potential to be used as predictors of PSA screening; nonetheless, they emphasised that improved access to PSA screening may be accompanied by detrimental consequences [45]. A recent research study among elderly Mexican men showed that those who attended school had undergone PSA screenings more often than those who did not attended school, which can be explained by the better financial situation of educated people [46].

Conclusions

In conclusion, the SES level is inversely correlated with the PC morality rate, which is a result of detecting the tumour in the earlier stages. A patient with a higher SES level has more access to medical care; furthermore, as the level of SES rises, the intention for undergoing a PSA screening test increases.

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References

1. Coffey DS. Prostate cancer. An overview of an increasing dilemma. *Cancer* 1993; 71(S3): 880–886.
2. Abate-Shen C, Shen MM. Molecular genetics of prostate cancer. *Genes Dev* 2000; 14(19): 2410–2434.
3. Wolf AM, Wender RC, Etzioni RB, et al. American Cancer Society guideline for the early detection of prostate cancer: update 2010. *CA Cancer J Clin* 2010; 60(2): 70–98.
4. Steenland K, Rodriguez C, Mondul A, et al. Prostate cancer incidence and survival in relation to education (United States). *Cancer Causes Control* 2004; 15(9): 939–945.
5. Coughlin SS. A review of social determinants of prostate cancer risk, stage, and survival. *Prostate Int* 2020; 8(2): 49–54.
6. Tingen MS, Weinrich SP, Heydt DD, et al. Perceived benefits: a predictor of participation in prostate cancer screening. *Cancer Nurs* 1998; 21(5): 349–357.
7. Eeden S, Van Den, Enger S, Caan B, et al., eds. Predictors of having a prostate-specific antigen (PSA) test. *Am J Epidemiol* 2003; 157(11): S92–S92.
8. Ndubuisi SC, Kofie VY, Andoh JY, et al. Black-white differences in the stage at presentation of prostate cancer in the District of Columbia. *Urology* 1995; 46(1): 71–77.
9. Mihor A, Tomsic S, Zagar T, et al. Socioeconomic inequalities in cancer incidence in Europe: a comprehensive review of population-based epidemiological studies. *Radiol Oncol* 2020; 54(1): 1–13.
10. Badal S, Aiken W, Morrison B, et al. Disparities in prostate cancer incidence and mortality rates: solvable or not? *Prostate* 2020; 80(1): 3–16.
11. Mirzaei A, Akbari MR, Zadeh SST, et al. Novel combination therapy of prostate cancer cells with arsenic trioxide and flutamide: an in-vitro study. *Tissue Cell* 2022; 74: 101684, doi: 10.1016/j.tice.2021.101684.
12. Siegel RL, Miller K, Jemal A. Cancer statistics, 2015. *CA Cancer J Clin* 2015; 65(1): 5–29.
13. Liu L, Cozen W, Bernstein L, et al. Changing relationship between socioeconomic status and prostate cancer incidence. *J Natl Cancer Inst* 2001; 93(9): 705–709.
14. Lin K, Lipsitz R, Miller T, et al. Benefits and harms of prostate-specific antigen screening for prostate cancer: an evidence update for the US Preventive Services Task Force. *Ann Intern Med* 2008; 149(3): 192–199.
15. Moyer VA. Screening for prostate cancer: US Preventive Services Task Force recommendation statement. *Ann Intern Med* 2012; 157(2): 120–134.
16. Ilic D, Neuberger MM, Djulbegovic M, et al. Screening for prostate cancer. *Cochrane Database Syst Rev* 2013; 2013(1): CD004720, doi: 10.1002/14651858.CD004720.pub3.
17. Smith RA, Andrews KS, Brooks D, et al. Cancer screening in the United States, 2018: a review of current American Cancer Society guidelines and current issues in cancer screening. *CA Cancer J Clin* 2018; 68(4): 297–316, doi: 10.3322/caac.21446.
18. Bell N, Gorber SC, Shane A, et al. Recommendations on screening for prostate cancer with the prostate-specific antigen test. *CMAJ* 2014; 186(16): 1225–1234.
19. Carroll PR, Parsons JK, Andriole G, et al. NCCN guidelines insights: prostate cancer early detection, version 2.2016. *J Natl Compr Canc Netw* 2016; 14(5): 509–519.
20. Qaseem A, Barry MJ, Denberg TD, et al. Screening for prostate cancer: a guidance statement from the Clinical Guidelines Committee of the American College of Physicians. *Ann Intern Med* 2013; 158(10): 761–769.
21. Schröder FH, Hugosson J, Roobol MJ, et al. Screening and prostate-cancer mortality in a randomized European study. *N Engl J Med* 2009; 360(13): 1320–1328.
22. IARC Working Group on the Evaluation of Carcinogenic Risks to Humans. *ARC Monographs on the Evaluation of Carcinogenic Risks to Humans.* Volume 96. Alcohol Consumption and Ethyl Carbamate. Lyon: IARC; 1988.
23. Møller H, Tønnesen H. Alcohol drinking, social class and cancer. *IARC Sci Publ* 1997; 138: 251–263.
24. Stellmen S, Resnicow K. Tobacco smoking, cancer and social class. *IARC Sci Publ* 1997; 138: 229–250.
25. Harvei S, Kravdal Ø. The importance of marital and socioeconomic status in incidence and survival of prostate cancer. *Prev Med* 1997; 26(5): 623–632.
26. Dorn HF, Cutler SJ. Morbidity from cancer in the United States. *Public Health Monogr* 1959; 56: 1–207.
27. Clemmesen J, Nielsen A. The social distribution of cancer in Copenhagen, 1943 to 1947. *Br J Cancer* 1951; 5(2): 159–171.
28. Cheng I, Witte JS, McClure LA, et al. Socioeconomic status and prostate cancer incidence and mortality rates among the diverse population of California. *Cancer Causes Control* 2009; 20(8): 1431–1440.

29. Hastert TA, Beresford SA, Sheppard L, et al. Disparities in cancer incidence and mortality by area-level socioeconomic status: a multilevel analysis. *J Epidemiol Community Health* 2015; 69(2): 168–176.
30. Tomic K, Ventimiglia E, Robinson D, et al. Socioeconomic status and diagnosis, treatment, and mortality in men with prostate cancer. Nationwide population-based study. *Int J Cancer* 2018; 142(12): 2478–2484.
31. Morton Jr RA. Racial differences in adenocarcinoma of the prostate in North American men. *Urology* 1994; 44(5): 637–645.
32. Pienta KJ, Esper PS. Risk factors for prostate cancer. *Ann Int Med* 1993; 118(10): 793–803.
33. Howard G, Anderson RT, Russell G, et al. Race, socioeconomic status, and cause-specific mortality. *Ann Intern Med* 1993; 118(10): 793–803.
34. Freeman VL, Ricardo AC, Campbell RT, et al. Association of Census Tract-Level Socioeconomic Status with Disparities in Prostate Cancer – Specific Survival Census Tract-Level SES and Prostate Cancer Survival. *Cancer Epidemiol Biomarkers Prev* 2011; 20(10): 2150–2159.
35. Kilpeläinen TP, Talala K, Raitanen J, et al. Prostate cancer and socioeconomic status in the Finnish randomized study of screening for prostate cancer. *Am J Epidemiol* 2016; 184(10): 720–731.
36. Shavers VL, Brown ML. Racial and ethnic disparities in the receipt of cancer treatment. *J Natl Cancer Inst* 2002; 94(5): 334–357.
37. McFall SL, Hamm RM, Volk RJ. Exploring beliefs about prostate cancer and early detection in men and women of three ethnic groups. *Patient Educ Couns* 2006; 61(1): 109–116.
38. Weinrich SP, Seger R, Miller BL, et al. Knowledge of the limitations associated with prostate cancer screening among low-income men. *Cancer Nurs* 2004; 27(6): 442–451.
39. Rapiti E, Fioretta G, Schaffar R, et al. Impact of socioeconomic status on prostate cancer diagnosis, treatment, and prognosis. *Cancer* 2009; 115(23): 5556–5565.
40. Rundle A, Neckerman KM, Sheehan D, et al. A prospective study of socioeconomic status, prostate cancer screening and incidence among men at high risk for prostate cancer. *Cancer Causes Control* 2013; 24(2): 297–303.
41. Sanderson M, Coker AL, Perez A, et al. A multilevel analysis of socioeconomic status and prostate cancer risk. *Ann Epidemiol* 2006; 16(12): 901–907.
42. Ross L, Kohler CL, Grimley DM, et al. Toward a model of prostate cancer information seeking: identifying salient behavioral and normative beliefs among African American men. *Health Educ Behav* 2007; 34(3): 422–440.
43. Winterich JA, Grzywacz JG, Quandt SA, et al. Men's knowledge and beliefs about prostate cancer: education, race, and screening status. *Ethn Dis* 2009; 19(2): 199–203.
44. Oranusi C, Mbieri U, Oranusi I, et al. Prostate cancer awareness and screening among male public servants in Anambra State, Nigeria. *Afr J Urol* 2012; 18(2): 72–74.
45. Kangmennaang J, Mkandawire P, Luginaah I. What prevents men aged 40–64 years from prostate cancer screening in Namibia*? J Cancer Epidemiol* 2016; 2016: 7962502.
46. Fernandez-Quilez A, Germán Borda M, Carreño GL, et al. Prostate cancer screening and socioeconomic disparities in mexican older adults. *Salud Publica Mex* 2020; 62(2): 121–122.

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Address for correspondence:
Prof. Seyed Mohammad Kazem Aghamir
Urology Research Center
Sina Hospital, Hassan Abad Sq.
Tehran University of Medical Sciences
Tehran
Iran
Tel.: +98 2166348560
E-mail: mkaghamir@tums.ac.ir