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Utilization of prostate cancer screening in Germany – An examination of influencing factors with special consideration of migration history

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Abstract

Background

Prostate cancer is the most common cancer and the third leading cause of cancer-related death among men in Europe. In Germany, men aged 45 and older are eligible for annual prostate cancer screening, which includes a digital rectal examination and, optionally, a prostate-specific antigen (PSA) test. However, the effectiveness of both methods remains controversial. Socioeconomic and demographic factors, such as education, income, and age, influence participation in screening, but the impact of migration history has not been sufficiently investigated in the German context.

Methods

Using data from the fourth wave of the lidA cohort study comprising 4196 men, the present study examines the factors that influence participation in prostate cancer screening in Germany, with a specific focus on migration history.

Results

Multivariable analysis showed that first-generation migrants were 24% less likely to participate in screening (aOR: 0.76; 95%-CI: 0.59–0.98; p = 0.034), while second-generation migrants showed no significant differences compared to non-migrants (aOR: 1.04; 95%-CI: 0.78–1.38; p = 0.808). Younger birth cohorts, low education level, low income, absence of pre-existing conditions and of a partner were significantly associated with lower participation.

Conclusions

Whether lower participation in screening has an impact on health outcomes remains unclear. The decision to participate in prostate cancer screening should be based on individualized counseling that considers both the benefits and risks of screening. Risk-adapted approaches that focus on factors such as age and family history could help to optimize the effectiveness of prostate cancer screening and reduce the risk of overdiagnosis and -treatment.

Background

Prostate cancer accounts for 23.2% of all new cancer cases and 9.9% of all cancer-related deaths, making it the most commonly diagnosed cancer in men and the third leading cause of cancer mortality in Europe [1]. Men with a first-degree relative (e.g. father or brother) diagnosed with prostate cancer have a two- to sixfold increased risk of developing the disease [2]. In Germany, men aged 45 and over are eligible for an annual prostate examination, which is covered by statutory health insurance. This includes

a medical history (anamnesis), a palpation of the prostate via digital rectal examination (DRE), as well as an examination of the surrounding lymph nodes and external genitalia [3]. In addition to the palpation examination, the prostate-specific antigen test (PSA test) is available for the early detection of prostate cancer, which (as of November 2024) is not covered by health insurance and must be paid for out of pocket by the patient as an “individual health service” („Individuelle Gesundheitsleistung“ IGeL). The PSA test measures the concentration of a protein in the blood that is often elevated in men with prostate cancer [2] .

Both procedures are highly controversial and have different limitations. Although DRE is considered the standard procedure in Germany, its sensitivity and specificity are limited, as small or difficult-to-access tumors in the prostate are often not detected [4, 5]. The accuracy also depends heavily on the experience of the examining doctor [4]. The PSA test, on the other hand, has a high sensitivity but a low specificity, i.e. although it detects many potential tumors, it cannot reliably differentiate between prostate cancer and prostate hyperplasia or other benign lesions. As a result, it often detects clinically benign lesions that would not have caused severe harm in the natural course of events. This in turn can lead to overdiagnosis and unnecessary treatment, which can be associated with significant side effects such as incontinence, bowel problems and erectile dysfunction [4].

International studies show contradictory results regarding the reduction of prostate cancer-specific mortality by PSA testing. The two most important randomized controlled trials include the *European Randomized Study of Screening for Prostate Cancer (ERSPC)* [6] and the *Prostate, Lung, Colorectal, and Ovarian Cancer Screening Trial (PLCO trial)* [7]. The largest European study ERSPC with 162,243 participants aged 55 to 69 years showed a significant reduction in prostate cancer-specific mortality of around 20 % afte 13 years with a PSA test [8]. However, to avoid one death, 34 additional prostate cancers had to be diagnosed, indicating a significant overdiagnosis rate [9]. In contrast, the American PLCO trial with 76,693 participants aged 55 to 74 years found no significant difference in mortality after 13 years between the screening group (PSA tests) and the control group (no PSA tests) [7]. However, the significance of this study is limited as it has a methodological constraint: there was a high contamination rate in the control group, as many participants still received PSA tests [4]. It is important to note that PSA levels may be evaluated differently in patients with a family history of prostate cancer. In these patients, an elevated PSA level may raise more concern and require more frequent monitoring than in patients without a family history.

The controversial study results and the trade-off between the benefits and harms of DRE and PSA testing have led to different recommendations from international professional societies. Since 2018, the *US Preventive Services Task Force (US-PSTF)* has recommended PSA screening for men aged 55 to 69 after a detailed medical consultation and based on an individual decision. This requires the patient’s explicit wish to utilize. However, PSA screening is not recommended for men over the age of 70 [10]. The US PSTF had previously suspended the PSA screening in 2012 due to perceived lack of benefit. However, this decision led to an increasing number of advanced and metastatic prostate cancer stages being diagnosed over the following decade, while early stages were detected less frequently. For this reason,

the USPSTF revisited the recommendation in 2018 [11]. In Germany several conflicting guidelines exist. The Federal Joint Committee (“Gemeinsamer Bundesausschuss” G-BA) recommends an annual DRE for men starting at age 45, but does not recommend PSA testing, and does not set an upper age limit for this examination [4]. In contrast, the S3 guideline of the Association of the Scientific Medical Societies in Germany (“Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften” AWMF), the German Cancer Society (“Deutsche Krebsgesellschaft” DKG) and the German Cancer Aid (“Deutsche Krebshilfe” DKH) is similar to the US-PSTF and emphasizes the importance of an informed decision by the patient. It recommends performing DRE or PSA tests in men aged 45 and older if they have a life expectancy of at least ten years and explicitly request the test after thorough counseling. For men over the age of 70 and with a PSA level below 1 ng/ml, the German S3 guideline generally advises against screening, as the risk of overdiagnosis is particularly high in older patients [4, 9].

Recent studies question the current prostate cancer screening program in Germany, as the sole funding of DRE without PSA testing and the lack of an upper age limit are considered unsystematic and ineffective [11–13]. Instead, a risk-adapted screening program is advocated, in which men are individually classified into risk groups for prostate cancer based on factors such as age, family history, and genetic predispositions. The PROBASE study, funded by the German Cancer Aid and running until 2035, follows this approach. Initial results from the study indicate that DRE, when used as the sole method for prostate cancer screening, is inadequate, as it detects only a small number of tumors. In contrast, current data suggest that PSA testing is more effective, particularly when performed at age 45 to establish a baseline PSA value. Men with low PSA levels would then require fewer follow-up examinations, reducing the rates of overdiagnosis and -treatment. This risk-adapted approach could enable more targeted and less invasive prostate cancer screening in the future [14, 15].

However, the current evidence regarding the effectiveness of prostate cancer screening remains unclear. Additionally, it has not been sufficiently studied which individuals actually participate in prostate cancer screening and which factors influence their participation. International studies show that demographic and socioeconomic factors play a role [16–18]. For example, it has been reported that people with a low level of education, low income and those living alone are less likely to attend prostate cancer screening [16]. Furthermore, an Australian study shows that immigrants from Asia and Europe are less likely to undergo PSA testing compared to Australian-born participants [17]. This may lead to immigrants being diagnosed with prostate cancer at more advanced stages [19]. For Germany, Sieverding et al. (2008) used a representative sample of 10,659 men aged 45 to 70 years to investigate the influence of socio-demographic factors such as age, education, income and family history as well as the importance of medical recommendations and participation in general screening examinations (“Check-up 35”) on the utilization of prostate cancer screening. The results show that participation increases with age and that medical recommendations and regular participation in general health check-ups (“Check-up 35”) are key predictors for utilizing prostate screening services [20]. It remains unclear how other diversity factors, such as migration history, influence the use of prostate cancer screening in Germany. To date, no study has systematically investigated the relationship between migration history and uptake of prostate cancer screening in Germany. The proportion of people with a history of migration in the German population is

steadily increasing and currently stands at 29.7% [21]. This group includes individuals who either themselves or whose parents (at least one) do not have German citizenship by birth [21]. Due to this development, examining healthcare access for this population group is becoming increasingly important. The aim of the present study is therefore to examine which factors influence participation in prostate cancer screening in Germany. Special attention will be paid to migration history, but other diversity characteristics such as age, education and income will also be taken into account. Insights into these factors can contribute to a better understanding of how screening is currently utilized and which factors influence its uptake. These findings may serve as a foundation for future research addressing the causes of potential disparities and evaluating the effectiveness of prostate cancer screening programs. In the long term, this will contribute to the development of targeted and diversity-sensitive measures to improve prostate cancer screening.

Methods

Data basis

The study is based on data from the fourth wave of the lidA study (“Leben in der Arbeit”), a nationwide cohort study that has been examining the relationships between work, aging, health, and labor force participation in Germany since 2009. The lidA study provides an ideal basis for the present analysis, as it allows for a differentiated examination of first- and second-generation migrants, an aspect that is not captured in many other studies. The fourth survey wave was conducted between May 10, 2022 and April 2, 2023. In addition to the original participants from the 1959 and 1965 birth cohorts, the fourth wave included a refreshment sample of these cohorts and an additional cohort born in 1971. The study population was drawn from the Integrated Employment Biographies (IEB) of the Federal Employment Agency in Germany, which include all employees subject to social insurance contributions as of December 31, 2009 (original sample) or 2019 (refreshment and top-up sample). Sworn civil servants and self-employed without social insurance contributions were not included. Data collection was carried out using Computer Assisted Personal Interviews (CAPI) and Computer Assisted Personal Interview by Phone (CAPI-by-Phone) [22]. The sample of the present study consists of all male participants in the fourth wave of the lidA study, who were eligible for prostate cancer screening in the last five years. The sample includes both employed individuals as well as retirees and unemployed individuals to ensure a comprehensive representation of the target group. The original sample of the fourth wave included a total of n = 8,814 individuals. After applying the inclusion criteria, the analyzed sample consists of n = 4,196 men.

Variables

The primary outcome of the study is the utilization of prostate cancer screening. Participants were asked whether they had undergone a screening for prostate cancer in the five years prior to the survey. No distinction was made between the performance of a digital rectal examination (DRE) or a PSA test. The response options were dichotomous, with "yes" or "no" as possible answers.

The primary independent variable is the migration history of the participants, which was divided into three categories: individuals without a history of migration, first-generation migrants, and second-generation migrants. First-generation migrants were defined as individuals born abroad who later immigrated to Germany. Second-generation migrants are individuals born in Germany with at least one parent born abroad.

Sociodemographic factors such as birth year, partnership status (partnered, not partnered), monthly net income (classified according to Lampert [23], see categorization in Table 1), and school education level (low, moderate, high) were included as additional independent variables. Furthermore, employment status (full-time, part-time, limited employment, or unemployed) was included in the analysis. These variables allow for a differentiated examination of the utilization of prostate cancer screening, considering potential influencing factors.

Analysis

Chi-square tests were first conducted to describe the distribution of variables according to migration status. This provided an initial overview of potential differences in sociodemographic and other covariates between individuals without a history of migration and those with a first- or second-generation migration history.

To investigate the impact of migration history and other independent variables on the utilization of prostate cancer screening, a multivariable logistic regression analysis was applied. The results of the logistic regression were presented as odds ratios (OR) with corresponding 95% confidence intervals (95%-CI). A significance level of $p < 0.05$ was used to determine statistical significance.

In addition, due to the small group size in certain categories (e.g. employment), the variables were combined for the analysis to protect privacy and avoid disclosure of individual data, while the distinction between the categories was maintained in the subsequent regression analyses.

Results

Of the 4,196 respondents, 83.3% had no migration history, 9.5% were first-generation migrants, and 7.1% were second-generation migrants. The distribution of sociodemographic characteristics and prostate cancer screening utilization showed clear differences between the groups (Table 1).

First-generation migrants were, on average, younger and more frequently represented in the lower income categories. For example, 21.3% of this group reported an income of less than 60% of the median income, compared to 7.9% in both the group without a migration history and the second-generation group.

Regarding educational level, both first-generation (28.1%) and second-generation (24.9%) migrants had a higher proportion of individuals with low education compared to respondents without a migration history (21.1%).

Prostate cancer screening utilization was significantly lower among first-generation migrants. 48.8% of this group reported having participated in a prostate cancer screening in the last five years, compared to 60.4% of individuals without a migration history. Second-generation migrants, however, showed similar participation behavior to non-migrants, with a participation rate of 59.4%.

Table 1
Description of the sample by migration history and generation (lidA cohort study 2023, n = 4196).

	Migration history				
	No migration history	**1st generation**	**2nd generation**	***p*-value ***	**Valid values N**
N	3497 (83.3%)	399 (9.5%)	300 (7.1%)		4196
Year of birth				**< 0.001**	4194
1959	1282 (36.7%)	108 (27.1%)	95 (31.8%)		
1965	1244 (35.6%)	118 (29.6%)	103 (34.4%)		
1971	970 (27.7%)	173 (43.4%)	101 (33.8%)		
Partnership status				**0.014**	4181
Partner	3017 (86.6%)	366 (91.7%)	258 (86.9%)		
No partner	468 (13.4%)	33 (8.3%)	39 (13.1%)		
Employment				0.644	4194
Full-time	2702 (77.3%)	323 (81.0%)	240 (80.0%)		
Part-time and limited employment	239 (6.8%)	25 (6.3%)	16 (5.3%)		
Unemployed	554 (15.9%)	51 (12.8%)	44 (14.7%)		
Education level				**0.016**	3995
Low	703 (21.1%)	106 (28.1%)	70 (24.9%)		
Moderate	1666 (49.9%)	164 (43.5%)	130 (46.3%)		
High	968 (29.0%)	107 (28.4%)	81 (28.8%)		
Monthly equivalent net income according to Lampert [23]				**< 0.001**	3992
< 60%	262 (7.9%)	79 (21.3%)	23 (7.9%)		
< 80%	261 (7.8%)	41 (11.1%)	22 (7.6%)		
< 100%	570 (17.1%)	69 (18.6%)	42 (14.4%)		
< 150%	1337 (40.2%)	116 (31.3%)	118 (40.5%)		

** p-value from chi-square test; statistically significant result in bold print*

	Migration history				
	No migration history	**1st generation**	**2nd generation**	***p*-value ***	**Valid values N**
≥ 150%	900 (27.0%)	66 (17.8%)	86 (29.6%)		
Pre-existing illnesses				0.088	4196
Yes	2888 (82.6%)	319 (79.9%)	259 (86.3%)		
No	609 (17.4%)	80 (20.1%)	41 (13.7%)		
Prostate cancer screening				**< 0.001**	3539
Yes	1775 (60.4%)	169 (48.8%)	152 (59.4%)		
No	1162 (39.6%)	177 (51.2%)	104 (40.6%)		
** p-value from chi-square test; statistically significant result in bold print*					

The differences in the utilization of prostate cancer screening remained significant even after adjusting for demographic and socioeconomic factors. The results of the multivariable logistic regression (Table 2) show that individuals with a first-generation migration history were at 24% lower odds of participating in prostate cancer screening (aOR: 0.76; 95%-CI: 0.59–0.98; p = 0.034). However, individuals with a second-generation migration history showed no significant differences compared to individuals without a migration history (aOR: 1.04; 95%-CI: 0.78–1.38; p = 0.808).

Regarding year of birth, men from younger cohorts had a lower likelihood of participating in screening. Compared to the reference group (birth year 1959), participation was significantly lower in the 1965 cohort (aOR: 0.79; 95% CI: 0.65–0.95; p = 0.012) and especially in the 1971 cohort (aOR: 0.43; 95%-CI: 0.35–0.52; p < 0.001).

Partnership status had a positive impact on participation: men with a partner were more than twice as likely to utilize screening compared to men without a partner (aOR: 2.11; 95%-CI: 1.68–2.64; p < 0.001).

Employment status showed no significant impact on participation.

Men with higher education were significantly more likely to participate in screening compared to men with low educational attainment (aOR: 1.37; 95%-CI: 1.09–1.71; p = 0.007). A moderate level of education, however, showed no significant impact (aOR: 1.12; 95%-CI: 0.93–1.36; p = 0.246).

Men in lower income groups had a significantly lower likelihood of participation, with the effect being particularly pronounced in the lowest income group (< 60% of median income) (aOR: 0.48; 95% CI: 0.34–

0.68; $p < 0.001$).

Finally, men with pre-existing illnesses had a significantly higher likelihood of participating in prostate cancer screening compared to men without pre-existing illnesses (aOR: 1.71; 95% CI: 1.41–2.08; $p < 0.001$).

Table 2
Results of the multivariable logistic regression with utilization of prostate cancer screening as the dependent variable. Adjusted odds ratios (aOR) and 95% confidence interval (95%-CI) (lidA cohort study 2023, n = 4196).

Independent variable	aOR	95%-CI	*p*-value*
Migration history (Ref.: No migration history)			
1st generation	0.76	0.59; 0.98	**0.034**
2nd generation	1.04	0.78; 1.38	0.808
Year of birth (Ref.: 1959)			
1965	0.79	0.65; 0.95	**0.012**
1971	0.43	0.35; 0.52	**< 0.001**
Partnership status (Ref.: No partner)			
Partner	2.11	1.68; 2.64	**< 0.001**
Employment (Ref.: Unemployed)			
Full-time	0.66	0.41; 1.06	0.085
Part-time	0.79	0.45; 1,37	0.399
Limited employment	0.77	0.26; 2.31	0.645
Education level (Ref.: Low)			
Moderate	1.12	0.93; 1.36	0.246
High	1.37	1.09; 1.71	**0.007**
Monthly equivalent net income according to Lampert (Ref.: ≥ 150%)			
< 60%	0.48	0.34; 0.68	**< 0.001**
< 80%	0.66	0.48; 0.90	**0.008**
< 100%	0.59	0.46; 0.74	**< 0.001**
< 150%	0.75	0.62; 0.91	**0.003**
Pre-existing illnesses (Ref: No)			
Yes	1.71	1.41; 2.08	**< 0.001**
***** *Statistically significant result in bold print*			

Discussion

This study provides important insights into prostate cancer screening utilization patterns in Germany and examines how diversity characteristics such as migration history and sociodemographic factors influence participation. Our results show that men with a first-generation migration history are significantly less likely to attend prostate cancer screening, while second-generation men have similar participation rates to non-migrants. This is consistent with other studies showing that first-generation migrants are less likely than non-migrants to utilize screening services, while second-generation migrants have comparable participation rates [24].

One possible explanation for the lower participation rate among first-generation migrants may be cultural differences in attitudes toward preventive screenings. In some countries of origin, cancer screening is less common, which may lead to lower familiarity with the concept of early detection and thus be reflected in lower participation rates [17]. In contrast, second-generation migrants are typically more integrated into the host country's healthcare system and more familiar with its structures [25], which is associated with utilization rates comparable to those of the majority population. Personal attitudes or cultural perceptions toward DRE may also play a role. Studies in migrant populations have shown that some men perceive this procedure as a threat to their masculinity, which can lead to refusal of the DRE [26]. A lower participation rate of first-generation migrants is considered a disadvantage in other screening areas, such as mammography screening or cervical cancer screening, whose effectiveness has been clearly demonstrated [27, 28], and is often explained by classic access barriers, such as language deficits or limited health literacy [29, 30]. In the case of prostate cancer screening, however, lower participation may have a protective effect by reducing the risk of harmful side effects from unnecessary treatments. International guidelines, such as the US-PSTF, do not recommend routine prostate cancer screening, as they are associated with significant disadvantages such as overdiagnosis, unnecessary treatments, and psychological burdens [10]. From this perspective, the lower screening uptake among first-generation migrants could be interpreted as a form of protection against potential harms. In contrast, second-generation migrants show similar participation rates to non-migrants. This suggests that social integration plays a key role in shaping preventive health behavior, but it also raises the question of whether increased integration and, consequently, higher screening uptake could, in the case of prostate cancer, actually be disadvantageous.

Our results confirm the relationship between socioeconomic status and the utilization of screening measures documented in other studies [20, 31–34]. Men with higher education and higher income were more likely to participate in prostate cancer screening, which is consistent with other studies from Germany [20], Switzerland [35], and Sweden [16]. The possible reasons for this correlation are manifold: Men with higher socioeconomic status often have better health literacy and a stronger health consciousness. Furthermore, they have easier access to medical services and may be more frequently encouraged by their doctors to undergo preventive screenings [36, 37]. In contrast, some studies suggest that greater knowledge about cancer screening does not necessarily lead to higher participation rates, as it can also increase awareness of the risks associated with treatment [38].

However, the observation of higher utilization of screening measures among individuals with higher socioeconomic status, which is often interpreted positively, should be critically examined in the case of prostate cancer screening. Randomized controlled trials such as the PLCO [7] and ERSPC [6] studies have shown that the benefit of prostate cancer screening in terms of reducing mortality is limited and often does not justify the associated risks. A Finnish study highlights this issue and shows that men with higher socioeconomic status, due to their higher screening rates, have an increased risk of being diagnosed with low to medium-risk prostate cancers, which may never have become clinically relevant. At the same time, the study shows that these men also have a significantly lower risk of advanced, incurable prostate cancers [39]. This finding confirms the suspicion that higher participation may protect against advanced cancers, but is also associated with significant disadvantages, such as overtreatment, psychological burdens, and treatment side effects. Other studies, however, have shown that higher health literacy is generally associated with better survival outcomes across various cancer stages, including stage II and III prostate cancer [40]. The reasons for this are multifactorial: men with higher health literacy tend to make more informed treatment decisions, show greater adherence to therapy recommendations, and experience better postoperative outcomes, resulting in fewer complications and overall lower mortality [40]. However, this does not contradict concerns about overdiagnosis: while greater screening participation among men with higher health literacy may lead to unnecessary diagnoses, health literacy remains essential for informed decision-making and optimal cancer management.

Furthermore, our results show that men born in 1971 are significantly less likely to participate in prostate cancer screening compared to men born in 1959. This indicates that younger men under the age of 55 are less likely to utilize screening services, which is consistent with previous research on this topic [20] and aligns with the recommendations of the US-PSTF [10].

Another important influencing factor identified in this study is partnership status. Men living with a partner were more than twice as likely to participate compared to those without a partner. A recently published Swedish study comes to similar conclusions, showing that men living in single-person households are 13% less likely to participate in PSA tests compared to men in multi-person households [16]. In contrast, the aforementioned German study shows that men with partners are less likely to participate in DREs and PSA tests [20]. This discrepancy could be due to different definitions of partnership status or differences in the sample composition, particularly regarding the fact that the lidA study includes only three birth cohorts, whereas other studies may consider a broader age range. Another possible explanation could be that the lidA study assessed participation over a period of five years, while other studies may have used shorter time frames.

A higher participation in prostate cancer screening was also observed among men with pre-existing illnesses. This group is generally more health-conscious and visits doctors more regularly. Despite the lack of clear evidence for the effectiveness of prostate cancer screening, doctors seem to recommend screening often to patients. This is supported by the study by Sieverding et al. (2008), which shows that a doctor's recommendation or participation in a regular general health check-up ("Check-up 35") was

associated with the most significant increase in prostate cancer screening utilization [20]. Given the unclear evidence regarding prostate cancer screening, doctors should not issue a general recommendation for participation, but should provide their patients with comprehensive information about the potential risks and benefits of screening based on their personal risk profile for prostate cancer [9].

Employment status was not associated with prostate cancer screening utilization, which is consistent with findings from other studies [35].

Despite the controversial evidence on prostate cancer screening, our study shows that a large proportion of the sample participated in screening in the last five years. The participation rate was 59.2%, which exceeds the rates reported in previous studies from Germany, which were 46% for DRE and PSA tests combined [20]. These differences may be due to methodological variations such as the inclusion of different age groups or periods of data collection.

Limitations

To our knowledge, this is the first study examining prostate cancer screening utilization in Germany with consideration of migration history. Several limitations must be considered when interpreting the results. One limitation is that the type of screening method (PSA test or DRE) was not recorded during data collection, making it impossible to analyze differences in the use of the two methods. The primary focus of the lidA study was to investigate, whether respondents participated in such screening examinations at all. Moreover, as the lidA study centers on work, age, health, and employment continuation of older workers, there was limited opportunity to address more specific secondary prevention measures. In addition, some potentially relevant health-related variables, such as smoking, alcohol consumption, hormonal status, previous cancer diagnoses, or PSA levels, were not available in the dataset and could therefore not be included in the analysis. The data are based on self-reports from the participants, which introduces the risk of recall bias or social desirability in responding to the survey questions. Another important aspect is the language of the survey, which was conducted exclusively in German. This has likely excluded men with a migration history, particularly from the first generation with limited German language skills, from participating. Finally, the study population is limited to three age cohorts (1959, 1965, 1971), meaning that the results cannot be generalized to the entire male population in Germany, although these age groups are at an age where the risk of prostate cancer increases.

Conclusions

The results show that various socioeconomic and demographic factors influence participation in prostate cancer screening. Men with a first-generation migration history, low educational level, low income, without pre-existing illnesses, and without a partner are less likely to participate in screening. Whether this lower participation has a positive or negative impact on their health cannot be definitively determined, given the ongoing controversy surrounding the effectiveness of prostate cancer screening. In this context, it is important to consider that the decision to participate in a screening examination is

made individually and based on comprehensive medical counseling regarding the advantages and disadvantages. A promising approach to reducing the known risks of prostate cancer screening could be a risk-adapted screening, such as the one currently being pursued in the PROBASE study. Such approaches could ensure appropriate early detection and help reduce overdiagnosis and -treatment. Future studies should investigate further which population groups actually benefit from prostate cancer screening and which groups may have risks that outweigh the benefits, in order to provide evidence-based health policy recommendations and optimize prostate cancer screening in the long term.

Abbreviations

DRE
Digital Rectal Examination
PSA test
Prostate-Specific Antigen Test
IGeL
Individuelle Gesundheitsleistung
ERSPC
European Randomized Study of Screening for Prostate Cancer
PLCO trial
Prostate, Lung, Colorectal, and Ovarian Cancer Screening Trial
US-PSTF
US Preventive Services Task Force
G-BA
Gemeinsamer Bundesausschuss
AWMF
Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften
DKG
Deutsche Krebsgesellschaft
DKH
Deutsche Krebshilfe
lidA
Leben in der Arbeit
CAPI
Computer Assisted Personal Interviews
CAPI-by-Phone
Computer Assisted Personal Interview by Phone

Declarations

Ethics approval and consent to participate

The study uses secondary data from a national survey collected by a national institution in Germany. Participation in the survey was anonymous and voluntary following participants' informed consent, and no experiments were involved. Considering national guidelines and recommendations for secondary data analysis, no further ethical endorsement was required for this analysis [41].

Consent for publication

Informed consent was obtained from all subjects involved in the study.

Availability of data and materials

The data sets analysed during the current study can be obtained in a reduced version as a Scientific Use File at the Research Data Center (FDZ) of the Institute for Employment Research (IAB) of the German Federal Employment Agency for interested researchers (https://fdz.iab.de/kontakt (accessed on 13 March 2025); information is only available in German language).

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

Conceptualization, D.W. and P.B.; methodology, D.W. and J-B. d. P.; software, J-B. d. P.; validation, D.W., J-B. d. P., J.B. and P.B.; formal analysis, D.W. and J-B. d. P; investigation, D.W., J-B. d. P., J.B. and P.B.; resources, J-B. d. P.; data curation, J-B. d. P; writing—original draft preparation, D.W.; writing—review and editing, D.W., J-B. d. P., J.B. and P.B; visualization, D.W.; supervision, P.B, J-B. d. P. and J.B.; project administration, P.B, J-B. d. P. and J.B.; funding acquisition, n / a. All authors have read and agreed to the published version of the manuscript.

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References

1. European Commission. Prostate cancer burden in EU-27 (2021) https://visitors-centre.jrc.ec.europa.eu/sites/default/files/poster_flyer/prostate_cancer_factsheet%5B1%5D_0.pdf
2. Alice Salzer (2024) Prävention und Früherkennung von Prostatakrebs. Onkologische Pharmazie 26:6–7

3. Gemeinsamer Bundesausschuss. Früherkennungsuntersuchungen im Überblick: Früherkennungsuntersuchungen der gesetzlichen Krankenversicherung im Überblick (2024) https://www.g-ba.de/themen/methodenbewertung/frueherkennungsuntersuchungen/. Accessed 6 Jan 2025
4. Günster C, Klauber J, Robra B-P, Schmacke N, Schmuker C (eds) (2019) Versorgungs-Report Früherkennung: Medizinisch Wissenschaftliche Verlagsgesellschaft
5. Catalona WJ, Smith DS, Ratliff TL, Dodds KM, Coplen DE, Yuan JJ et al (1991) Measurement of prostate-specific antigen in serum as a screening test for prostate cancer. N Engl J Med 324:1156–1161. 10.1056/NEJM199104253241702
6. Hugosson J, Roobol MJ, Månsson M, Tammela TLJ, Zappa M, Nelen V et al (2019) A 16-yr Follow-up of the European Randomized study of Screening for Prostate Cancer. Eur Urol 76:43–51. 10.1016/j.eururo.2019.02.009
7. Andriole GL, Crawford ED, Grubb RL, Buys SS, Chia D, Church TR et al (2012) Prostate cancer screening in the randomized Prostate, Lung, Colorectal, and Ovarian Cancer Screening Trial: mortality results after 13 years of follow-up. J Natl Cancer Inst 104:125–132. 10.1093/jnci/djr500
8. Schröder FH, Hugosson J, Roobol MJ, Tammela TLJ, Zappa M, Nelen V et al (2014) Screening and prostate cancer mortality: results of the European Randomised Study of Screening for Prostate Cancer (ERSPC) at 13 years of follow-up. Lancet 384:2027–2035. 10.1016/S0140-6736(14)60525-0
9. AMWF online. S3-Leitlinie Prostatakarzinom (Version 7.0 – Mai 2024 AWMF-Registernummer: 043-022OL): Leitlinie (Langversion) (2024) https://register.awmf.org/assets/guidelines/043-022OLl_S3_Prostatakarzinom_2024-06.pdf. Accessed 6 Jan 2025
10. Grossman DC, Curry SJ, Owens DK, Bibbins-Domingo K, Caughey AB, Davidson KW et al (2018) Screening for Prostate Cancer: US Preventive Services Task Force Recommendation Statement. JAMA 319:1901–1913. 10.1001/jama.2018.3710
11. Einecke D (2023) Ein Prostatakrebs-Screening, das die Mortalität senkt. [Not Available]. MMW Fortschr Med 165:12–14. 10.1007/s15006-023-2842-y
12. Schneider TR, Boehm K, Schneider AW, Huber J, Leitsmann M (2021) Früherkennung Prostatakrebs: Ist der PSA-Test sinnvoll? onkologie heute. 8:10–19
13. Boedefeld EA (2020) Früherkennung von Prostatakrebs. In: Schmoll H-J (ed) Kompendium Internistische Onkologie. Springer Berlin Heidelberg, Berlin, Heidelberg, pp 1–15. doi:10.1007/978-3-662-46764-0_77-1.
14. Albers P (2024) Neuer Ansatz bei der Prostatakarzinom-Früherkennung: Neuer Ansatz bei der Prostatakarzinom-Früherkennung PROBASE-Studie untersucht ein risikoangepasstes Screening. MMW Fortschr Med
15. Arsov C, Albers P, Herkommer K, Gschwend J, Imkamp F, Peters I et al (2022) A randomized trial of risk-adapted screening for prostate cancer in young men-Results of the first screening round of the PROBASE trial. Int J Cancer 150:1861–1869. 10.1002/ijc.33940

16. Järbur E, Holmberg E, Björk-Eriksson T, Bratt O, Arnsrud Godtman R (2024) Associations between socioeconomic factors and PSA testing in a population-based organised testing programme and routine healthcare: a register-based study of 50-year-old men. bmjonc 3:e000400. 10.1136/bmjonc-2024-000400
17. Weber MF, Chiew M, Feletto E, Kahn C, Sitas F, Webster L (2014) Cancer Screening among immigrants living in urban and regional Australia: results from the 45 and up study. Int J Environ Res Public Health 11:8251–8266. 10.3390/ijerph110808251
18. Consedine NS, Morgenstern AH, Kudadjie-Gyamfi E, Magai C, Neugut AI (2006) Prostate cancer screening behavior in men from seven ethnic groups: the fear factor. Cancer Epidemiol Biomarkers Prev 15:228–237. 10.1158/1055-9965.EPI-05-0019
19. Harvey-Sullivan A, Ali S, Dhesi P, Hart J, Painter H, Walter FM et al (2024) Comparing cancer stage at diagnosis between migrants and non-migrants: a meta-analysis. Br J Cancer. 10.1038/s41416-024-02896-0
20. Sieverding M, Matterne U, Ciccarello L, Luboldt H-J (2008) Prostatakarzinomfrüherkennung in Deutschland. Untersuchung einer repräsentativen Bevölkerungsstichprobe. [Early detection of prostate cancer in Germany. A study of a representative random sample of the population]. Urologe A 47:1233–1238. 10.1007/s00120-008-1695-4
21. Statistisches Bundesamt. Bevölkerung mit Migrationshintergrund- Statistischer Bericht - Mikrozensus - Bevölkerung nach Migrationshintergrund - Erstergebnisse 2023 (2024) https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bevoelkerung/Migration-Integration/Publikationen/_publikationen-innen-migrationshintergrund.html. Accessed 6 Jan 2025
22. Ruiz Marcos J, Steinweide J, Kleudgen M (2024) Methodenbericht lidA Welle 4
23. Lampert T, Kroll LE (2005) Einfluss der Einkommensposition auf die Gesundheit und Lebenserwartung
24. Wiessner C, Keil T, Krist L, Zeeb H, Dragano N, Schmidt B et al (2020) Personen mit Migrationshintergrund in der NAKO Gesundheitsstudie – soziodemografische Merkmale und Vergleiche mit der autochthonen deutschen Bevölkerung. [Persons with migration background in the German National Cohort (NAKO)-sociodemographic characteristics and comparisons with the German autochthonous population]. Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz 63:279–289. 10.1007/s00103-020-03097-9
25. Conde FA, Landier W, Ishida D, Bell R, Cuaresma CF, Misola J (2011) Barriers and facilitators of prostate cancer screening among Filipino men in Hawaii. Oncol Nurs Forum 38:227–233. 10.1188/11.ONF.227-233
26. Persaud H, Yuan J, Afable A, Bruno DM (2021) Barriers to Prostate Cancer Screening Among Indo-Guyanese. J Community Health 46:591–596. 10.1007/s10900-020-00926-5
27. Zielonke N, Gini A, Jansen EEL, Anttila A, Segnan N, Ponti A et al (2020) Evidence for reducing cancer-specific mortality due to screening for breast cancer in Europe: A systematic review. Eur J Cancer 127:191–206. 10.1016/j.ejca.2019.12.010

28. Jansen EEL, Zielonke N, Gini A, Anttila A, Segnan N, Vokó Z et al (2020) Effect of organised cervical cancer screening on cervical cancer mortality in Europe: a systematic review. Eur J Cancer 127:207–223. 10.1016/j.ejca.2019.12.013
29. Crawford J, Ahmad F, Beaton D, Bierman AS (2016) Cancer screening behaviours among South Asian immigrants in the UK, US and Canada: a scoping study. Health Soc Care Community 24:123–153. 10.1111/hsc.12208
30. Keetile M, Ndlovu K, Letamo G, Disang M, Yaya S, Navaneetham K (2021) Factors associated with and socioeconomic inequalities in breast and cervical cancer screening among women aged 15–64 years in Botswana. PLoS ONE 16:e0255581. 10.1371/journal.pone.0255581
31. Sassenou J, Ringa V, Zins M, Ozguler A, Paquet S, Panjo H et al (2023) Combined influence of immigration status and income on cervical cancer screening uptake. Prev Med Rep 36:102363. 10.1016/j.pmedr.2023.102363
32. Tomic K, Ventimiglia E, Robinson D, Häggström C, Lambe M, Stattin P (2018) Socioeconomic status and diagnosis, treatment, and mortality in men with prostate cancer. Nationwide population-based study. Int J Cancer 142:2478–2484. 10.1002/ijc.31272
33. Rajaguru V, Kim TH, Shin J, Lee SG (2022) Income Disparities in Cancer Screening: A Cross-Sectional Study of the Korean National Health and Nutrition Examination Survey, 2013–2019. Front Public Health 10:820643. 10.3389/fpubh.2022.820643
34. Damiani G, Federico B, Basso D, Ronconi A, Bianchi CBNA, Anzellotti GM et al (2012) Socioeconomic disparities in the uptake of breast and cervical cancer screening in Italy: a cross sectional study. BMC Public Health 12:99. 10.1186/1471-2458-12-99
35. Guessous I, Cullati S, Fedewa SA, Burton-Jeangros C, Courvoisier DS, Manor O, Bouchardy C (2016) Prostate cancer screening in Switzerland: 20-year trends and socioeconomic disparities. Prev Med 82:83–91. 10.1016/j.ypmed.2015.11.009
36. von Wagner C, Good A, Whitaker KL, Wardle J (2011) Psychosocial determinants of socioeconomic inequalities in cancer screening participation: a conceptual framework. Epidemiol Rev 33:135–147. 10.1093/epirev/mxq018
37. Bryere J, Dejardin O, Bouvier V, Colonna M, Guizard A-V, Troussard X et al (2014) Socioeconomic environment and cancer incidence: a French population-based study in Normandy. BMC Cancer 14:87. 10.1186/1471-2407-14-87
38. Kannengießer L, Ulbrich R, Hasenpusch C, Hrudey I, Walter S, Stallmann C et al (2024) Determinanten der Inanspruchnahme der Krebsfrüherkennung von älteren Erwachsenen in Sachsen-Anhalt – Welchen Einfluss hat die Gesundheitskompetenz auf die Inanspruchnahme? [Determinants of the utilization of cancer screening among older adults in Saxony-Anhalt-What is the influence of health literacy?]. Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz 67:45–56. 10.1007/s00103-023-03806-0
39. Kilpeläinen TP, Talala K, Raitanen J, Taari K, Kujala P, Tammela TLJ, Auvinen A (2016) Prostate Cancer and Socioeconomic Status in the Finnish Randomized Study of Screening for Prostate

Cancer. Am J Epidemiol 184:720–731. 10.1093/aje/kww084

40. Al HA, Awamlh B, Moses KA, Whitman J, Stewart T, Kripalani S, Idrees K (2025) Health literacy and all-cause mortality among cancer patients. Cancer 131:e35794. 10.1002/cncr.35794
41. Arbeitsgruppe (2008) und Nutzung von Sekundärdaten'; 'Epidemiologische Methoden' der DGSMP/DGEpi/GMDS. GPS—Gute Praxis Sekundärdatenanalyse: Revision nach grundlegender Überarbeitung. Gesundheitswesen 70:54–60