VILNIUS UNIVERSITY

RENATA ŠTURIENĖ

**PROSTATE CANCER INCIDENCE AND MORTALITY TRENDS
IN LITHUANIA AND MEN'S BELIEFS IN FAVOUR
OF PROSTATE CANCER SCREENING**

Doctoral Dissertation
Biomedical Sciences, Public Health (09 B)

Vilnius, 2012

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Scientific Supervisor:
Prof. Dr. Habil. Danutė Kalibatienė (Vilnius University, biomedical sciences, medicine – 06 B).

Scientific Consultant:
Doc. Dr. Romualdas Gurevičius (Institute of Hygiene of the Ministry of Health of the Republic of Lithuania, biomedical sciences, public health – 09 B).

The dissertation will be defended at the Vilnius University Board of Public Health Science:

Chairman:
Prof. Dr. Habil. Algirdas Juozulynas (Vilnius University, biomedical sciences, public health – 09 B)

Members:

Prof. Dr. Rimantas Stukas (Vilnius University, biomedical sciences, public health – 09 B)
Prof. Dr. Jolanta Dadonienė (Vilnius University, biomedical sciences, medicina – 06 B)
Prof. Dr. Habil. Ramunė Kalėdienė (Lithuanian University of Health Sciences, biomedical sciences, public health – 09 B)
Prof. Dr. Ričardas Radišauskas (Lithuanian University of Health Sciences, biomedical sciences, medicine – 06 B)

Opponents:
Prof. Dr. Janina Didžiapetrienė (Vilnius University, biomedical sciences, medicine – 06 B)
Prof. Dr. Habil. Konstancija Jankauskienė (Lithuanian University of Health Sciences, biomedical sciences, public health – 09 B)

The dissertation will be defended at the open session of the Vilnius University Board of Public Health Science on 12 December 2012 at 13.30 o'clock in the Grand Hall (203) of the Vilnius University Faculty of Medicine.
Address: M.K. Čiurlionio str. 21, LT-03101 Vilnius, Lithuania.

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VILNIAUS UNIVERSITETAS

RENATA ŠTURIENĖ

SERGAMUMO PROSTATOS VĖŽIU IR MIRTINGUMO NUO JO YPATUMAI LIETUVOJE BEI VYRŲ NUOSTATOS, SKATINANČIOS DALYVAVIMĄ PROSTATOS VĖŽIO PATIKROS PROGRAMOJE

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Mokslinis vadovas:
prof. habil. dr. Danutė Kalibatienė (Vilniaus universitetas, biomedicinos mokslai, medicina – 06 B).

Mokslinis konsultantas:
doc. dr. Romualdas Gurevičius (Lietuvos SAM higienos institutas, biomedicinos mokslai, visuomenės sveikata – 09 B).

Disertacija ginama Vilniaus universiteto Visuomenės sveikatos mokslo krypties taryboje:

Pirmininkas:
Prof. habil. dr. Algirdas Juozulynas (Vilniaus universitetas, biomedicinos mokslai, visuomenės sveikata – 09 B)

Nariai:

Prof. dr. Rimantas Stukas (Vilniaus universitetas, biomedicinos mokslai, visuomenės sveikata – 09 B)
Prof. dr. Jolanta Dadonienė (Vilniaus universitetas, biomedicinos mokslai, medicina – 06 B)
Prof. habil. dr. Ramunė Kalėdienė (Lietuvos sveikatos mokslų universitetas, biomedicinos mokslai, visuomenės sveikata – 09 B)
Prof. dr. Ričardas Radišauskas (Lietuvos sveikatos mokslų universitetas, biomedicinos mokslai, medicina – 06 B)

Oponentai:
Prof. dr. Janina Didžiapetrienė (Vilniaus universitetas, biomedicinos mokslai, medicina – 06 B)
Prof. habil. dr. Konstancija Jankauskienė (Lietuvos sveikatos mokslų universitetas, biomedicinos mokslai, visuomenės sveikata – 09 B)

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ABBREVIATIONS

AAC – average annual change

AAPC – average annual per cent change

ANOVA – Analysis of Variance

APC – age–period–cohort

Cr – cumulative rate

CR – cumulative risk

CV – coefficient of variation

df – degrees of freedom

EAU – European Association of Urology

LUTS – lower urinary tract symptoms

MAD – mean absolute deviation

MAPE – mean absolute percentage error

MH – Ministry of Health of the Republic of Lithuania

MSD – mean squared deviation

NHIF – National Health Insurance Fund

PSA – prostate-specific antigen

SES – socioeconomic status

The Programme - The Prostate Gland Cancer Early Detection Programme

WHO – World Health Organisation

1. BACKGROUND

1.1. Research problem and its relevance

Prostate cancer has been the most common cancer among men in Lithuania. The fastest growth rates in cases of these malignant tumors have recently been observed, rising from 563 cases in 1995 to 2005 in 2005. In 2007, 40 per cent of newly-diagnosed malignant tumors among men were prostate cancer (3638 cases). Together with the increasing number of cases, the incidence rate also grew. Between 1995 and 2007 the prostate cancer incidence rate increased by an average of 17.4 per cent per year. This increase is associated with improving diagnostic methods, the widespread application of Prostate-Specific Antigen screening in clinical practice and the involvement of younger men in early detection programs. The early detection of prostate cancer and new effective treatment methods significantly improved the patient survival rate; other factors that are likely to affect its increase are age, the diagnosis period and the stage of illness at the time of diagnosis. An increase in the prostate cancer survival rate in Lithuania was observed when comparing the periods from 1993 to 1997 and 1998 to 2002, with a respective 33 per cent (95 per cent CI 31.2-34.8) and 47.6 per cent (95 per cent CI 46.1-49) of affected men surviving five years after diagnosis. Even though the survival rate in Lithuania is observed as growing, it still remains one of the lowest compared with figures from other European countries.

Early-stage prostate cancer is very hard to detect because it does not produce any specific symptoms such as pain or urinary incontinence. The disease spreads and develops slowly. Clinical symptoms may appear and cause health problems only after several years. Treatment is effective when the disease is detected at an early stage and it is therefore very important to apply methods for the early detection of prostate cancer.

In 2005, the World Health Assembly invited all countries to develop and implement effective cancer control programs that would rely on evidence-based strategies. It should be noted that a well-planned and managed national program for fighting cancer reduces mortality and improves the quality of life of cancer patients, irrespective of the resources the country can provide. The main aim of an effective cancer control strategy is to reduce cancer incidence and overcome disparities in the area of cancer control. Primary prevention, along with other measures, has an important role in facilitating the strategy's implementation. Its main objectives are: the control of risk factors and causes

of the disease, particularly in high-risk groups; the organization of effective early detection tests; educating the population on health; and the formation of positive health beliefs.

When preventive tests are carried out, more low-risk early stage tumors are detected and the number of cases of locally advanced and metastatic diseases is decreasing. As a result of screening programs, prostate cancer is diagnosed earlier; therefore, radical treatment can be prescribed to more patients (an increase from 67 to 92 per cent) and the survival rate increases.

Positive attitudes towards screening programs are crucial for the successful implementation of preventive measures against the disease. People's disposition towards health and their willingness to act for its sake are influenced by biological, social, economic and cultural factors such as ethnic characteristics, genetic makeup, age, education, economical status, lifestyle and health beliefs. Research from the last decade has shown how differences in socioeconomic status are reflected in the practice of oncology screening. According to this research, socioeconomic factors such as income, the amount of insurance cover, work or profession, determine whether people actively participate in screening programs for cancer or are reluctant to do so. Low socioeconomic status (SES) is associated with less active participation in the prostate cancer screening program; however, it has no effect on prostate cancer incidence in a particular social or ethnic group. The association between SES and health has been widely researched in order to determine which socioeconomic aspects (e.g. income, education, marital status) are truly important here.

Despite the rather extensive research, the relationship between SES and differences in health still requires clarification. The direct mechanism by which SES affects health and health-related consequences is also unclear. In order to reduce health disparities, it is very important to understand the role of socioeconomic and cultural environment in predisposing people towards a particular health-related behavior. Understanding the relationship between this environment and cancer screening is critical for developing an appropriate and effective cancer prevention and control program.

1.2. Aim and objectives

The aim of this study is to provide an integrated analysis of prostate cancer incidence trends in Lithuania in time and space, to determine their relationship with secondary prevention measures and to assess men's health beliefs and attitudes towards participating in the organized screening program.

The following objectives were set in order to achieve this aim:

1. To reveal prostate cancer incidence and mortality trends in Lithuania in different age categories and cohorts.
2. To determine the possible association, as well as its nature and strength, between the numbers of patients diagnosed with prostate cancer and the intensity of organized screening program throughout the country's municipalities.
3. To assess the health beliefs and attitudes of men who attended the prostate cancer early detection program towards participating in the organized screening, as well as their social and demographic situation.
4. To measure men's awareness of prostate cancer as one of the important factors in stimulating participation in the early detection program by analyzing their knowledge of prostate cancer risk factors, clinical symptoms, side effects from treatment and limitations of prostate cancer screening, as well as their social and demographic situation.

1.3. Scientific novelty of the study

The study provides an in-depth analysis of prostate cancer incidence and mortality and the dynamics trends of cumulative risk rates in Lithuania by employing JoinPoint regression and age–period–cohort methods to juxtapose these population statistics indicators.

By means of modern descriptive epidemiology and mapping methodology, discrepancies between prostate cancer incidence and financing of the secondary prevention program were observed. The study also determined the relationship between these indicators, its nature and strength in men aged 50 to 74 in 60 Lithuanian municipalities.

The study analyzed the health beliefs of Lithuanian men who participated in the prostate cancer early detection program, including the relationship between those beliefs

and social and demographic factors. For this purpose, an adapted V. Champion's questionnaire was used for the first time in Lithuania in the context of prostate cancer to survey men's health beliefs and attitudes towards participating in the screening program.

Prostate cancer awareness among men who participated in the early detection program was assessed using the adapted questionnaire of S. P. Weinrich et al. The relationship between such knowledge and social and demographic factors was also determined.

1.4. Statements to defend

- The significant increase in the incidence of prostate cancer observed between 2005 and 2007 is likely to be associated with the newly-implemented prostate cancer secondary prevention program.
- The incidence of prostate cancer is likely to be greater in municipalities which absorbed more funding for this program.
- Motivation is likely to be the most important factor determining participation in the prostate cancer prevention program; motivation is also likely to be related to men's social status.
- Knowledge of prostate cancer risk factors, clinical symptoms, side effects from treatment and screening limitations is likely to be both insufficient and dependent on social factors that affect respondents.

2. MATERIALS AND METHODS

2.1. Methodology of the prostate cancer incidence and mortality research

The study uses primary data on newly-diagnosed cases of prostate cancer in Lithuania between 1998 and 2007 obtained from the Lithuanian Cancer Registry. Data on prostate cancer mortality and average annual population in the same age groups was obtained from the Eurostat database.

In view of the fact that prostate cancer is a disease of older men and its incidence is directly associated with age, the age of men with prostate cancer and those who died of it is grouped into three broad categories: (i) under 55, (ii) 55 to 74, (iii) 75 and over.

The time period for analysis of prostate cancer incidence and mortality was 10 years – 1998 to 2007. The time period for segmented analysis of prostate cancer incidence and mortality trends, which required a long time series, was 30 years – 1978 to 2007. An analysis of trends using the age–period–cohort model must be conducted by dividing time into 5-year intervals, so the time period for this was 30 years – 1979 to 2008. To assess the geographic distribution of prostate cancer incidence in 60 Lithuanian municipalities, a three-year average was used (2006 to 2008).

The following definitions of factors examined were used to model and interpret the results of prostate cancer incidence and mortality trends:

Period effect is the effect of the surrounding environment characteristic of a particular time period and fully determined by that period.

Cohort (or generation) effect is the surrounding environment's effect on each cohort during a particular time period when the cohort reaches a certain age.

Age effect is the effect of cell differentiation, ageing and maturation, irrespective of time and experience.

Data on funding for the prostate cancer secondary prevention program across municipalities (in litas) were obtained from the National Health Insurance Fund. Data on newly-diagnosed prostate cancer cases were obtained from the SVEIDRA database, using a special algorithm for the query. Data on the average population in the 50-74 age group from 2006 to 2008 across municipalities was obtained from the Lithuanian Department of Statistics (Statistics Lithuania). Using these data, prostate cancer incidence rates were calculated for target groups of 100,000 men across 60 municipalities.

The program funding intensity for target groups of 1,000 men was also calculated, using the following formula: (sum in litas/number of men in the target group) x 1,000.

2.2. Survey of men's health beliefs and prostate cancer awareness
2.2.1. Survey sample

The survey of men's health beliefs and attitudes towards prostate cancer early detection programs was conducted between March 2009 and July 2011 at Šeškinė Outpatient Clinic, a public institution of the city of Vilnius. The survey population comprised 6,276 patients who visited their general practitioner and were prescribed a PSA test under the prostate gland cancer early detection program implemented in Lithuania in 2005.

The sample size was calculated using a special program developed specifically for this purpose. The following requirements were set: a 2 per cent margin of error and 95 per cent confidence level in a survey population of 6,276, requiring a sample size of no less than 1,737 respondents. The program restricted respondents to those aged between 45 and 75. Every third patient was randomly selected and surveyed, with the sample size comprising 1,842 respondents.

2.2.2. Survey questionnaire methodology

V. Champion's questionnaire for oncology disease prevention programs was used with the author's permission for surveying health beliefs. The questionnaire comprised 46 questions divided into 5 categories. 5 questions addressed perceived susceptibility, with 7 addressing perceived severity, 15 perceived benefits, 12 perceived barriers and 7 health motivation. Every question had three possible answers arranged on a Likert-type scale: disagree (1 point), neutral (2 points), agree (3 points). The internal consistency of the questions (Cronbach's alpha coefficient) in relation to the conceptions was thus: Susceptibility – 0.891; Severity – 0.869; Motivation – 0.732; Barriers – 0.801; Benefits – 0.799.

The questionnaire of S. P. Weinrich et al. was used to measure prostate cancer awareness among men. Cronbach's alpha coefficient for internal consistency of its questions was 0.77. The questionnaire comprised 12 questions with three possible answers: one (1) – yes; two (2) – no; three (3) – don't know. Certain groups of questions reflected the attitude towards prostate cancer risk factors (questions 1, 3, 5), clinical symptoms (questions 2, 4), limitations (questions 9–12) and side effects from treatment (questions 6–8). According to the questionnaire of Weinrich et al. (2004), affirmative answers to questions 1, 2, 4, 5, 6, 7, 11 and 12 and negative answers to questions 3, 8, 9 and 10 were considered correct. When points from all answers were summed, the total score ranged from 2 to 12. A score of 2 signified 2 correct answers and 12 meant that all answers were correct.

The part of the questionnaire covering socio-demographic factors comprised respondents' age, birth place, place of residence (village, town), marital status (married, unmarried, divorced, widower, other), education level (primary, finished/unfinished sec-

ondary, vocational, finished/unfinished higher education) and social group (blue-collar or white-collar worker, pensioner, disabled, other).

2.2.3. Survey procedure

Permission to conduct the biomedical survey was granted by the Lithuanian Bioethics Committee (Protocol No. 158200-01-446-127).

At the start of the survey period, the questionnaire was tested with a preliminary survey of 20 patients who had been prescribed a prostate-specific antigen (PSA) test. Unclear questions were clarified.

Šeškinė Outpatient Clinic, a public institution of the city of Vilnius, hosts 57 general practices. Upon arrival of the first patient to see a doctor, a specially-trained community nurse offers him a questionnaire to complete. The nurse checks whether the questionnaire is filled in correctly and answers any questions the patient might have in relation to it. Every third patient who meets the screening criteria is then also given a questionnaire. When a patient refuses to fill it in, the questionnaire is given to the next patient. Random sampling ensured that a sample of 30 per cent was selected.

2.3. Statistical analysis of the data

Statistical analysis of the survey data was performed using Microsoft Excel 2003 for Windows and SPSS 17.0 for Windows software.

Using the direct standardization method, the rates were age-standardized against the European Standard Population. The standard data processing software package, WinPepi Describe, was used for this purpose. Another rate obtained using the direct standardization method was analyzed alongside it, but with different 'weights' (age interval width) – the cumulative rate (Cr) and cumulative risk rate.

The linear regression model (y = a + bx) was used to calculate the dynamic parameters of standardized rates. A relative measure was used to assess the dynamic - the average annual per cent change (AAPC). It is calculated using the following formula:

$$AAPC = \left(\sqrt[n-1]{\frac{\overline{Y_L}}{\overline{Y_F}}} - 1 \right) \times 100\%$$

Where Y_F is a theoretical value of the starting mortality rate, Y_L is a theoretical value of the last mortality rate and n is the number of years.

To assess the quality of fit of the regression model, 3 accuracy measures were used – MAPE, MAD and MSD.

The statistical significance of a trend was assessed using the p criterion.

The trends of prostate cancer incidence and mortality analysis were assessed using the JoinPoint regression method. This was performed using JoinPoint software (2008, version 3.3.1), available at the US National Cancer Institute.

Geographic variability in analyzed rates was assessed using the coefficient of variation:

$$CV = \frac{SD}{M} \times 100$$

The relationship between prostate cancer incidence and absorbed funding was calculated using a non-parametric Spearman's rank correlation coefficient and graphically represented in a scatter diagram.

The analysis of modeling incidence and mortality trends in relation to age–period–cohort has been described in detail.

Hierarchies of different linear models were analyzed using the GLIM 3.77 statistical package, which uses the modern maximum likelihood estimation method for this purpose.

In analyzing the data of the survey a descriptive characteristics method was used to estimate numerical characteristics: the total number of observations (N), mean (M), standard deviation of the mean (SD), mode, median, minimum (Min) and maximum (Max).

In investigating the health beliefs of respondents, an analysis of variance (ANOVA) methodology was used to determine differences in continuous variables (score for an answer) against categorical variables (5 categories with 5 to 15 questions in each). ANOVA helps to find the variance of the mean of a continuous variable and its statistical significance in relation to a categorical variable. The level of statistical significance was determined using Fisher's criterion, F. For assessing the statistical difference between two means under comparison, the t criterion was used.

In investigating prostate cancer awareness among respondents, a cross-tabulation procedure was performed when analyzing answers that were attributed nominal values. One variable is age, education, marital status and social group and the other includes all twelve questions asked. The statistical significance of the difference between answers in relation to the first variable and to the twelve questions was determined using Pearson's χ^2 test. In the analysis where one variable (the continuous variable) is the score for an answer, an analysis of variance was used and the statistical significance of the mean score in relation the first group of questions was determined using Fisher's criterion, F. In all the above cases, the difference was considered statistically significant when $p \leq 0.05$.

3. RESULTS

3.1. Prostate cancer incidence and mortality trends in Lithuania

3.1.1. Changes in general rates

At the beginning of the period in question, 708 new cases of prostate cancer were diagnosed in 1998 in Lithuania, with 42.5 cases per 100,000 men. The incidence rate increased slightly until 2001, when 1,007 new cases of prostate cancer were diagnosed and the rate was 61.9 cases per 100,000 men. A significantly larger increase was observed between 2001 and 2004: 1,956 new cases were diagnosed in 2004 and the incidence rate rose to 122 cases per 100,000 men. Between 2004 and 2005, the incidence rate remained the same for unknown reasons, but started rising sharply from 2005 (the AAPC between 1998 and 2005 was 14.44, and between 2005 and 2007 was 34.77). Age-standardized rates showed the same trends, but their rate of increase during the decade analyzed was smaller (Fig. 1).
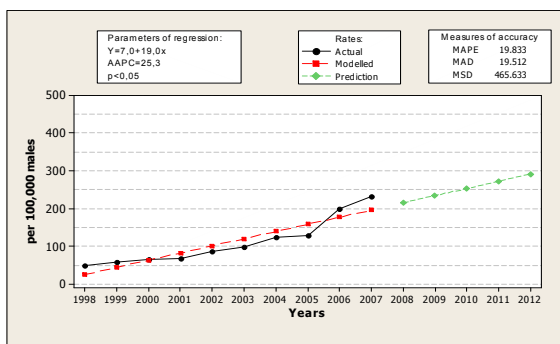
Figure 1. Trends of standardized prostate cancer incidence in Lithuania between 1998 and 2007

Between 1998 and 2007, the crude rate of incidence increased on average by 19.8 cases per 100,000 men, or 30.7 per cent per year. The standardized rate increased on average by 19 cases per 100,000 men and 25.3 per cent per year. This shows that only 5.4 per cent of the prostate cancer incidence increase in the period in question was due to ageing among Lithuanian men (Fig. 2).
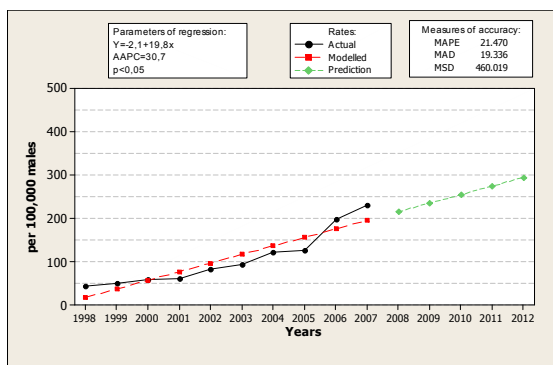

Figure 2. Dynamics of crude prostate cancer incidence in Lithuania between 1998 and 2007

In 1998, 365 men died of prostate cancer, with 21.9 deaths per 100,000 men. Thus, the mortality rate was 18.7 per cent lower than the incidence rate. As was the case with prostate cancer incidence, mortality showed a slight increasing trend. Between 2000

and 2003, the prostate cancer mortality rate stabilized. In 2000, 423 men died of prostate cancer, a mortality rate of 25.2 deaths per 100,000 men; in 2001, 428 men died of prostate cancer, a rate of 26.3 deaths per 100,000 men; and in 2003, 430 men died of prostate cancer, a rate of 26.7 cases per 100,000 men. This means that it was decreasing on average by -0.68 per cent.

In 2005, 447 men died of prostate cancer, a rate of 30 deaths per 100,000 men. In 2006, 552 men died of prostate cancer, a rate of 34.9 deaths per 100,000 men; in 2007 the figure was 582, a rate of 37 deaths per 100,000 men. Between 2003 and 2007 two leaps in the prostate cancer mortality rate were observed: the first was smaller – between 2003 and 2005 the rate increased on average by 4.72 per cent per year; the second, larger one, was observed between 2005 and 2007 – the mortality rate increased on average by 10.03 per cent per year (Fig. 3).
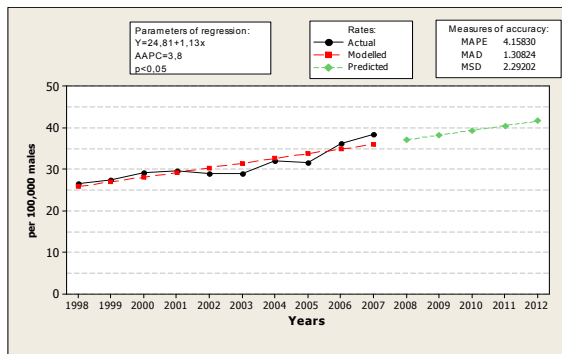
Figure 3. Trends of standardized prostate cancer mortality in Lithuania between 1998 and 2007

During the period in question, the crude mortality rate increased on average by 1.51 deaths per 100,000 men, or 5.6 per cent per year. The standardized rate increased on average by 1.13 deaths per 100,000 men, or 3.8 per cent per year. This indicates that 1.8 per cent of the prostate cancer mortality increase in the decade was due to ageing among Lithuanian men (Fig. 4).

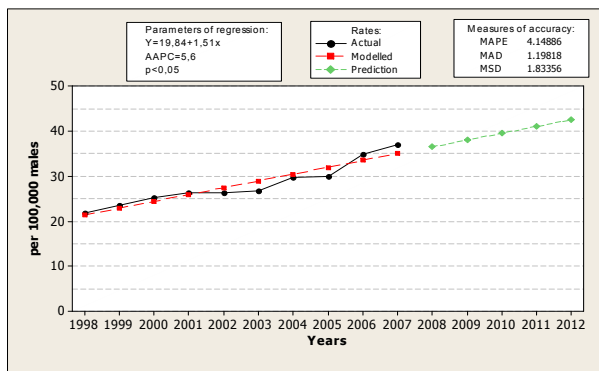**Figure 4. Trends of crude prostate cancer mortality per 100,000 men in Lithuania between 1998 and 2007**

3.1.2. Rate changes in age groups (categories)

In the age category of men under 55, the mean relative weight of newly-diagnosed prostate cancer cases was only 3 per cent and varied in the period in question from the lowest (1.3 per cent) in 1985 to the highest (6.5 per cent) in 2007. The relative weight of newly-diagnosed patients in this age category in Lithuania started to increase steadily from 1999, and especially from 2003. A particularly dramatic increase in the number of newly-diagnosed patients was observed from 2005 onwards, when the relative weight increased twofold – from 3.3 per cent in 2005 to 6.5 per cent in 2007.

Prostate cancer incidence in men aged under 55 years showed a slight increasing trend until 2000; then there was a fairly steady increase until 2003 and a particularly sharp rise from 2005 onwards (Fig. 5).
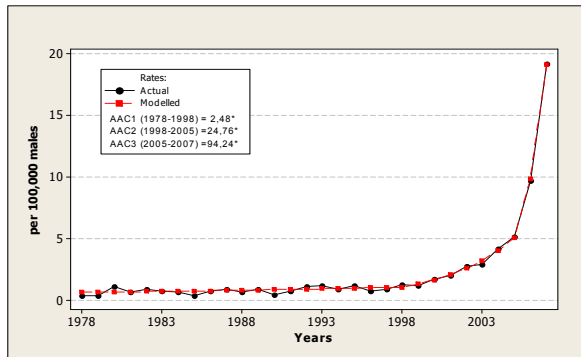
Figure legend (inside chart):
Rates:
Actual
Modelled
AAC1 (1978-1998) = 2,48*
AAC2 (1998-2005) =24,76*
AAC3 (2005-2007) =94,24*

Y-axis: per 100,000 males
X-axis: Years (1978, 1983, 1988, 1993, 1998, 2003)

Figure 5. Trends of prostate cancer incidence in the category of men aged under 55 years in Lithuania between 1978 and 2007

The regression model for estimating turning points divided the thirty-year period in question into three intervals of Trends, in each of which a statistically significant increase in the incidence of prostate cancer was observed: this increased by an average of 2.5 per cent per year between 1978 and 1998, while between 1998 and 2005 it increased tenfold and was estimated at an average of 24.8 per cent per year. In the third interval (from 2005 to 2007), the incidence rate increased by an average of 94 per cent per year (95% CI from 59.3 to 136.8). The incidence rate increased fourfold compared with the second interval and 38 times compared with the first.

In the second age category (from 55 to 74 years), the mean relative weight of newly-diagnosed prostate cancer cases was 55.5 per cent and varied in the period in question from the lowest (44.3 per cent) in 1984 to the highest (73.8 per cent) in 2007. The relative weight of newly-diagnosed patients in this age category in Lithuania decreased from 55.3 per cent in 1981 to 44.3 per cent in 1984, but from 1985 started to grow steadily, from 46.3 per cent to 57.5 per cent in 1994. It stabilized between 1996 and 1998, when the figures were 60.5 and 60.7 per cent respectively. From 1999, the relative weight started to grow again, from 57.2 per cent to 73.8 per cent in 2007. A particularly dramatic increase in the number of newly-diagnosed patients was observed from 2004 onwards, with the relative weight increasing from 61.2 per cent in 2004 to 73.8 per cent in 2007.

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Prostate cancer incidence in the second age category showed a slight decreasing trend until 1990; then there was a fairly steady increase until 2000 and a particularly sharp increase from 2005 onwards (Fig. 6).
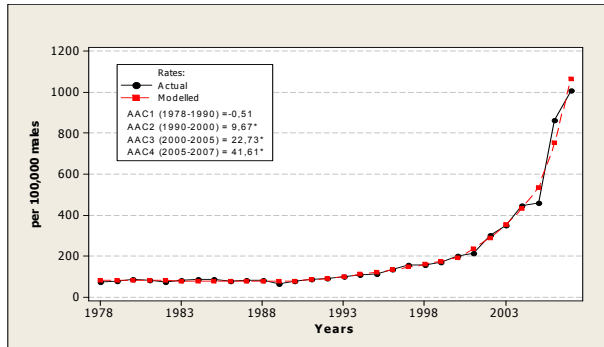

Figure 6. Trends of prostate cancer incidence in the category of men aged 55 to 74 in Lithuania between 1978 and 2007

The thirty-year period analyzed using the JoinPoint regression method was divided into 4 intervals of Trends. In the first interval (from 1978 to 1990), the incidence rate decreased by an average of 0.5 per cent per year. In the remaining three intervals, a statistically significant increase in incidence was observed: between 1990 and 2000 the number increased by an average of 9.7 per cent per year, while the figure for the interval between 2000 and 2005 was 22.7 per cent per year. During the fourth period (from 2005 to 2007), the incidence almost doubled compared with the third period and increased 4.5 times compared with the second, by an average of 41.6 per cent per year (95% CI from 32.8 to 51.0).

In the category of men aged 75 and older, the mean relative weight of newly-diagnosed prostate cancer cases was 41.6 per cent and varied in the period in question from the lowest (19.7 per cent) in 2007 to the highest (53.5 per cent) in 1984. The relative weight of newly-diagnosed patients in this age category in Lithuania decreased from 44.8 per cent in 1978 to 41.6 per cent in 1981. From 1982 it started to grow steadily, from 48.1 per cent to 53.5 per cent in 1984. Between 1987 and 1998 it decreased again, from 50.6 to 36.9 per cent; and from 1999 the relative weight decreased, from 40.8 per cent to 19.7 per cent in 2007.

The incidence of prostate cancer in the second age category showed a slight increasing trend until 1991; then there was a fairly steady increase until 2005, while between 2005 and 2007 the incidence of prostate cancer decreased (Fig. 7).
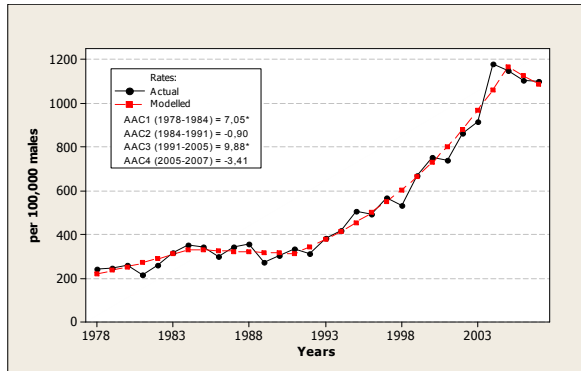

Figure 7. Trends of prostate cancer incidence rates in the category of men aged 75 and older in Lithuania between 1978 and 2007

The thirty-year period analyzed using the JoinPoint regression method was divided into 4 intervals of Trends. In the first interval (from 1978 to 1984), a statistically significant average increase of 7 per cent per year was observed. The second interval (from 1984 to 1991) showed a statistically significant average increase of 0.9 per cent per year, and in the third (from 1991 to 2005) there was a statistically significant average increase of 9.9 per cent per year. In the fourth interval (from 2005 to 2007), the incidence of prostate cancer decreased by an average of 3.4 per cent per year (95% CI from 0 to 12.6).

In the category of men aged under 55, the mean relative weight of men who died from prostate cancer was fairly similar to that of newly-diagnosed cases: it stood at 2.3 per cent and varied in the period in question from the lowest level (1.1 per cent) in 2006 to the highest (4.2 per cent) in 1987. The relative weight of patients in this age category in Lithuania who died from prostate cancer varied sharply in terms of trends, most often standing at 1.7 per cent during the period. In 2006, patients in this age category who died comprised 1.1 per cent of all such deaths, while in 2007 the relative weight doubled and comprised 2.4 per cent.

Prostate cancer mortality in this age category varied sharply in terms of trends (Fig. 8).
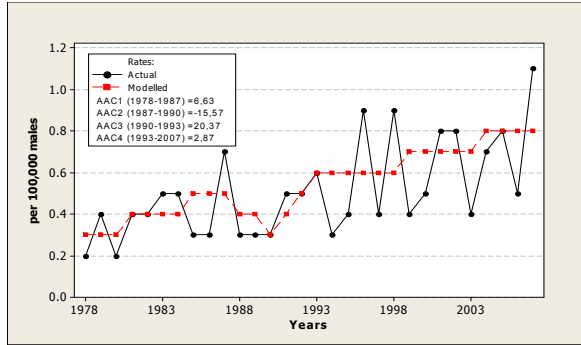

Figure 8. Trends of prostate cancer mortality in the category of men aged under 55 in Lithuania between 1978 and 2007

JoinPoint regression analysis identified 4 time segments in the thirty-year period: the first showed an average increase of 6.6 per cent in the mortality rate per year (from 1978 to 1987); the second showed an average decrease of 15.6 per cent per year (from 1987 to 1990); the third showed an average increase of 20.4 per cent per year (from 1990 to 1993); and the fourth showed an average increase of 2.9 per cent (from 1993 to 2007; 95% CI from −1.7 to 7.7; Table 2). However, considerable variability meant these changes in mortality trends were not statistically significant and may therefore be accidental.

In the category of men aged 55 to 74, the mean relative weight of those who died from prostate cancer was 46.4 per cent and varied in the period considered from the lowest level (38.9 per cent) in 1988 to the highest (53.2 per cent) in 1978. The figure was most often at 46.8 per cent. In 2005, patients of this age category who died from prostate cancer comprised 41.7 per cent of all such deaths, while in 2007 the relative weight decreased to 39.7 per cent.

Prostate cancer mortality in this age category varied in terms of trends (Fig. 9).
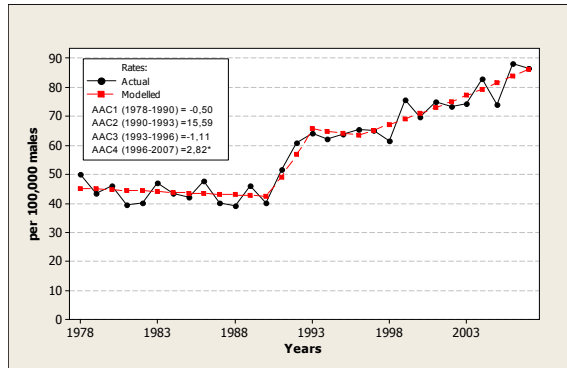
Figure 9. Trends of prostate cancer mortality in the category of men aged 55 to 74 in Lithuania between 1978 and 2007

The regression model for estimating turning points identified 4 time segments in the thirty-year period. Three time segments show statistically insignificant changes: an average decrease of 0.5 per cent per year in the first (from 1978 to 1990); an average increase in mortality rate of 15.6 per cent per year in the second (from 1990 to 1993); and an average decrease of 1.1 per cent per year in the third (from 1993 to 1996). In a fourth and final segment (from 1996 to 2007), a statistically significant average increase in mortality rate of 2.8 per cent per year is observed (95% CI from 1.6 to 4.0).

In the category of men aged 75 and older, the mean relative weight of those who died of prostate cancer was 51.3 per cent and varied in the period considered from the lowest level (45.2 per cent) in 1978 to the highest (59.0 per cent) in 1988. The relative weight was most often 45.8 per cent between 1992 and 1993, and 56.2 per cent between 2005 and 2006. In 2004, patients in this age category who died from prostate cancer comprised 51.4 per cent of all such deaths, while in 2007 the relative weight increased to 57.9 per cent. Prostate cancer mortality among men aged 75 and older varied in trends (Fig. 10).
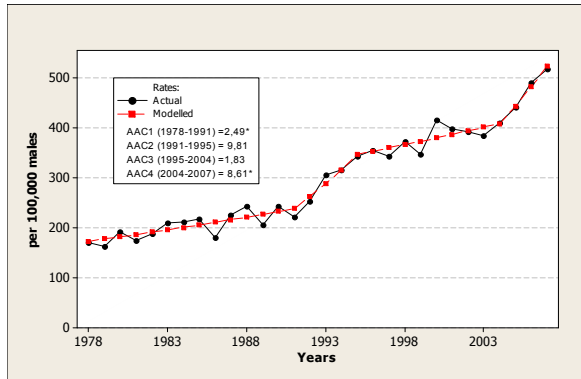
Figure 10. Trends of prostate cancer mortality in the category of men aged 75 and older in Lithuania between 1978 and 2007

JoinPoint regression analysis identified 4 time segments in the thirty-year period. A statistically significant average increase of 2.5 per cent per year was observed in the first time period (from 1978 to 1991). In the second (from 1991 to 1995) and third (from 1995 to 2004) time segments, statistically insignificant mortality rate increases that respectively averaged 9.8 per cent and 1.8 per cent per year were observed. In the fourth and final segment (from 2004 to 2007), a statistically significant average increase in mortality rate of 8.6 per cent per year was observed (95% CI from 1.3 to 16.3).

3.1.3. Age–period–cohort factors and their interaction in the trends of prostate cancer incidence in Lithuania between 1979 and 2008.

The age-effect curve for the incidence of prostate cancer in Lithuania in the thirty-year period (from 1979 to 2008) is shown in Figure 11. As age increases, the incidence of prostate cancer rises sharply until the age of 67 (from 65 to 69); it then continues rising, but at a slower rate. Between the age of 77 and the next age interval, there is a slight decrease in the incidence of prostate cancer.
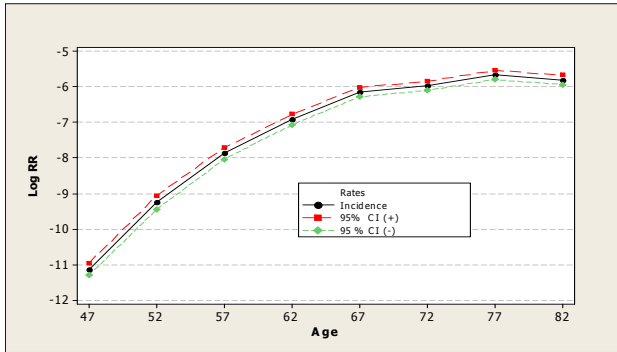
Figure 11. Age-effect curve for the incidence of prostate cancer in Lithuania between 1979 and 2008, and confidence intervals at different quinquennia (full age + period + cohort model)

An assessment of the period effect showed consistent growth in the incidence of prostate cancer, albeit with different speeds at different periods: between 1986 and 1991 the incidence level increased slightly, but during the following periods (intervals) considerably faster growth was observed, especially in the final period (from 2001 to 2006; Fig. 12).
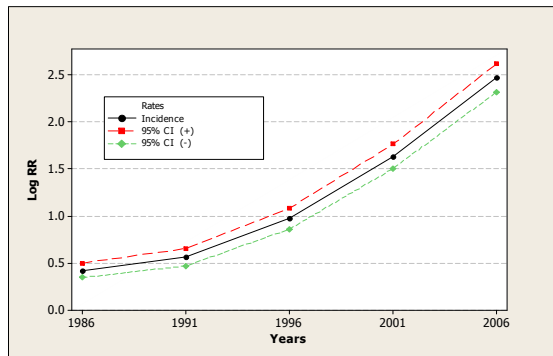
Figure 12. Period-effect curve for the incidence of prostate cancer in Lithuania between 1979 and 2008 and its confidence interval at different quinquennia (full age + period + cohort model)

The cohort effect shows a high incidence of prostate cancer in the first few cohorts, with a decreasing trend until 1929 as the year of birth; the incidence of prostate

cancer among those born between 1929 and 1934 stabilized, while the incidence among those born after 1934 increased rapidly with every following cohort; the prostate cancer incidence in the last cohort was greater than that in the oldest (Fig. 13).
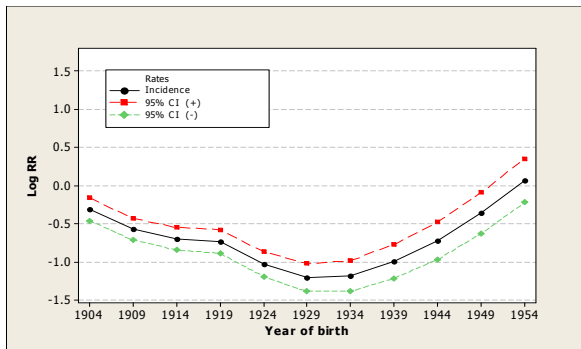
Figure 13. Cohort-effect curve for the incidence of prostate cancer in Lithuania between 1979 and 2008 and its confidence interval at different quinquennia (full age + period + cohort model)

A rapid increasing trend in the incidence of prostate cancer in relation to age groups and year of birth was observed across all cohorts in the thirty-year period (Fig. 14).
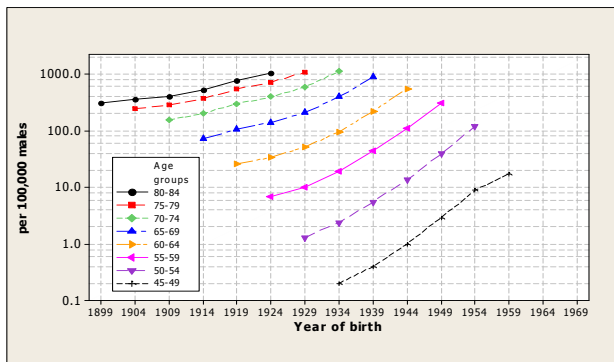
Figure 14. Trends in the incidence of prostate cancer in Lithuania between 1979 and 2008 in different age groups in relation to the birth year of the cohort (full age + period + cohort model)

3.2. Disparities in the incidence of prostate cancer and the prevention programme in Lithuania between 2006 and 2008

The mean incidence rate of prostate cancer was 779.5 per 100,000 men. The variability of these rates among 60 municipalities was high, with a coefficient of variation of 43.6 per cent. The lowest incidence rate was observed in the municipality of Kazlų Rūda, at 146.8, and the highest was in the municipality of Kretinga district, at 1,619.3 cases per 100,000 men. Variation in the incidence rate may be accidental, as the municipality of Kazlų Rūda is very small.

The incidence of prostate cancer per target group of 100,000 men (aged 50 to 74) is displayed in Figure 15.
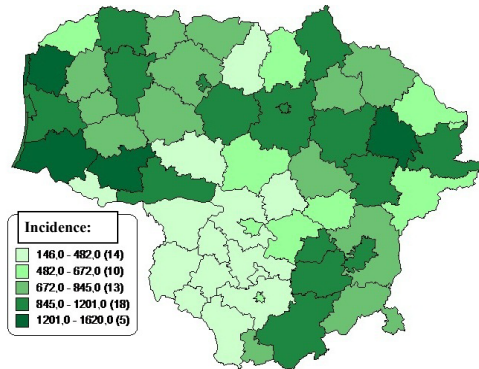
Figure 15. Prostate cancer incidence per target group of 100,000 men (aged 50 to 74) between 2006 and 2008

High and very high rates (from 845 to 1,620) of newly-diagnosed prostate cancer cases per 100,000 men in a target group are observed in 23 municipalities, which are more heavily concentrated in the west of the country. An average level of incidence (from 672 to 845 newly-diagnosed prostate cancer cases per 100,000 men in a target group) is scattered unevenly, with no discernible trend in concentration (13 municipalities). Low and very low incidence of prostate cancer incidence (from 146 to 672 cases per 100,000 men in a target group) was observed in 24 municipalities, which were more heavily concentrated in the south of Lithuania.

The average funding indicated from the assessment of data across 60 municipalities is 15,600 litas per 1,000 men in a target group. Funding intensity rates varied less, at 30.8 per cent. The lowest funding rate was observed in the municipality of Panevėžys district, at 6,100 litas, and the highest was in the municipality of Druskininkai, at 33,200 litas per 1,000 men in a target group.

Funding rates in the cartogram (Fig. 16) are almost identical to prostate cancer incidence rates in the cartogram above, although there are several exceptions. Municipalities where the incidence of prostate cancer is higher also show a higher concentration of funding (a larger allocation of money): from 19,700 to 33,200 litas in the municipalities of Šilutė district, Palanga city, Kretinga district and Utena district.
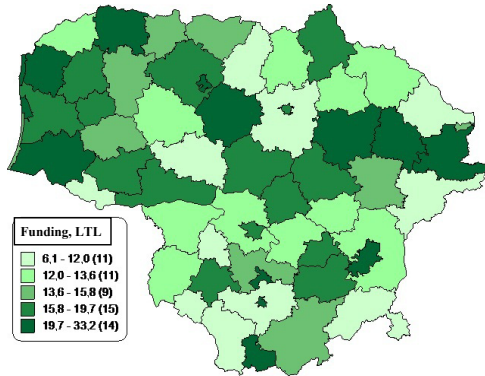
Figure 16. Funding per 1,000 men of a target group between 2006 and 2008

Using a non-parametric Spearman's rank correlation analysis, it was calculated that the relationship between the incidence of prostate cancer and the funding intensity rate (litas per 1,000 men in a target group) was statistically significant, but only medium-strength ($\rho = 0.555$, $p < 0.05$).

In order to highlight this, we represented the correlation data in a special diagram (Fig. 17). The x-axis represents funding (thousands of litas per 1,000 men in a target group) and the y-axis the incidence of prostate cancer per 100,000 men in a target group (aged 50 to 74). In the upper medial and upper lateral sectors (three-quarters of municipalities, covering Utena district, Šilutė district, Palanga city, Kretinga district and other municipalities), a positive correlation (direct association) is observed, i.e. the greater the

funding, the higher the incidence of prostate cancer. However, municipalities in the upper medial and lower lateral sector show an opposite trend, with lower funding correlating with a higher incidence of prostate cancer. These municipalities include Tauragė district (50), Telšiai district (53), Molėtai district (56), Biržai district (31) and Trakai (4). The municipalities of Druskininkai (39), Birštonas (9), Alytus city (38), Ignalina district (60) and Mažeikiai district (51) allocated more funding, but in these areas the incidence of prostate cancer is low.
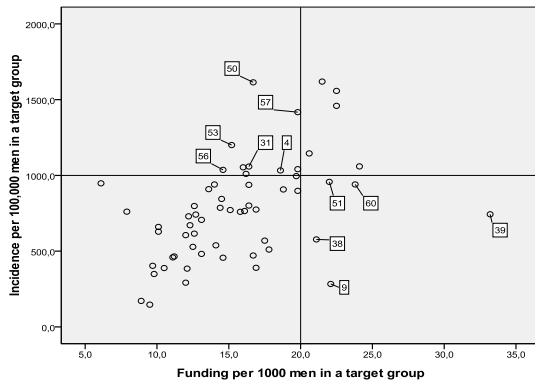
Figure 17. Relationship between funding and the incidence of prostate cancer in 60 municipalities

3.3. Health beliefs of men who participated in the prostate cancer screening program and their relationship to social and demographic factors

3.3.1. Analysis of social and demographic characteristics of respondents

A total of 1,842 men who participated in the prostate cancer early detection program were included in the survey. Their age varied between 45 and 79, with an average (mean) age of 59.4 (SD-6.3) and a most frequent age (mode) of 57. Half the respondents were aged 59 or under and the other half were older than 59. 96.4 per cent of respondents lived in urban areas and 3.6 per cent in rural areas. The vast majority of men were married (90 per cent), had received a secondary education (30.9 per cent) and belonged to a social group of blue-collar workers (34 per cent; Table 1).

Table 1. Socio-demographical characteristics of respondents

Socio-demographical characteristics	Surveyed group										
	N	%	N	%	N	%	N	%	N	%	N	%
Marital status	married		unmarried		unregistered marriage		divorced		widower		spouse lives separately	
	1657	90	35	1.9	22	1.2	62	3.4	62	3.4	4	0.2
Education	primary		unfinished secondary		secondary		further		unfinished higher		higher	
	24	1.3	101	5.5	570	30.9	550	29.9	98	5.3	499	27.1
Social group	blue-collar worker		white-collar worker		pensioner		disabled		unemployed	
	N		%		N	%	N	%	N	%	N	%
	627		34		588	31.9	419	22.7	125	6.8	83	4.5

3.3.2. Health beliefs assessment

Using V. Champion's questionnaire for oncology disease prevention programs, five areas of health beliefs were assessed: perceived susceptibility to prostate cancer, perceived severity of the disease, perceived benefits of participating in the prevention program, perceived barriers to participation and health motivation. The variety of responses to questions from all groups was wide. The differences between mean scores for answers to questions within a section were statistically significant across all groups: for perceived susceptibility $F_{(4, 9205)} = 18.826$, P = 0.0001; for perceived severity $F_{(6, 12887)} = 28.984$, P = 0.0001; for perceived barriers (to participating in the program) $F_{(11, 22092)} = 389.613$, P = 0.0001; for perceived benefits (of participating in the program) $F_{(14, 27615)} = 87.573$, P = 0.0001; for health motivation $F_{(6, 12887)} = 406.977$, P = 0.0001.

The degree of perceived susceptibility to prostate cancer was assessed in view of the responses to five questions of the section (Fig. 18). The degree of perceived susceptibility was somewhat higher than the average (the overall mean score of 1.81). Among these questions, respondents found it likeliest that their chances of getting prostate cancer are higher than those of other men (1.88 points) and least likely that they will get prostate cancer in the near future (1.73 points). Certain contradictions in respondents' answers about perceived susceptibility have been observed. In respondents' opinion, it is theoretically possible that they are more likely to get prostate cancer than other men, but they do

not agree that they will get it in the near future. Respondents understand that their chances of getting it are high in general, but do not agree that they will get prostate cancer within the next ten years. The results show that men who attend screening lack information about their risk of getting prostate cancer and fear the disease. Undue fear might cause stress and reduce quality of life; numbers of men attending screenings may also decrease.
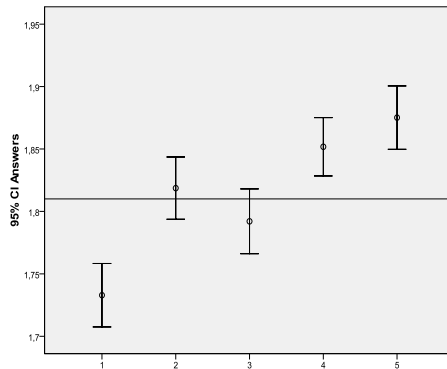

Figure 18. Perceived susceptibility scores (horizontal line is the overall mean score)
1 - It is very likely that I will get prostate cancer in the near future; 2 - I feel I will get prostate cancer in the near future; 3 – There is a high probability that I will get prostate cancer within the next 10 years; 4 - The chance that I will get prostate cancer is high; 5 - My chance of getting prostate cancer is higher than that of other men.

When comparing responses in the context of a social group, a statistically significant difference was found between mean scores in response to the statement 'It is very likely that I will get prostate cancer in the near future' ($F_{(4.1837)}$ = 2.768, P = 0.026). The unemployed (1.86 points) and disabled (1.78 points) were more convinced than others that they will get prostate cancer. Responses to other questions were fairly similar across social groups, but blue-collar workers tended to fear the disease more. Compared with other groups, blue-collar workers more often felt that they would get prostate cancer in the near future (1.84 points), that their chances of getting prostate cancer are high (1.87 points) and that they are likelier to get prostate cancer than other men (1.89 points). These statements were least supported by the disabled (1.73, 1.86 and 1.80 points respectively).

In assessing the relationship between the level of education and perceived susceptibility, no statistically significant difference was observed in responses to all the section's questions. Men with secondary or unfinished secondary education feared more often than others that they were very likely to get prostate cancer in the future (1.77 points). Men with primary education were more worried than others that there is a high probability they will get prostate cancer within the next 10 years (1.92 points), that their chances of getting prostate cancer are high (1.96 points) and that their chances of getting prostate cancer are higher than those of other men (1.92 points). However, no clear association between level of education and the conception of perceived susceptibility has been observed, as levels of worry and fear of the disease were similar across all education-level groups.

In analyzing the relationship between marital status and perceived susceptibility, no statistically significant difference was observed in responses to all the section's questions. However, single men feared more often than others that they will get prostate, with unmarried men in particular thinking they are likely to get the disease in the future (1.86 points) and that their chances of getting prostate cancer within the next 10 years are high (1.86 points). Divorced men thought more commonly than others that their chances of getting prostate cancer are higher than those of other men (1.90 points).

The overall mean score in the section on perceived severity (2.17 points) was considerably greater than that in the section on perceived susceptibility section (1.81 points; $F_{(6.12887)} = 28.984$, $P = 0.0001$). In an assessment of the results (Fig. 19), it was found that most respondents agreed with the following statements: 'I am afraid to think about prostate cancer' (with a mean score is 2.27 out of 3) and 'If I get prostate cancer, my whole life will change' (with a mean score is 2.27 out of 3). Lower scores were recorded for the following statements: 'Thinking about prostate cancer frightens me' (with a mean score of 2.04 points) and 'Prostate cancer would cause me long-term problems' (2.10 points).
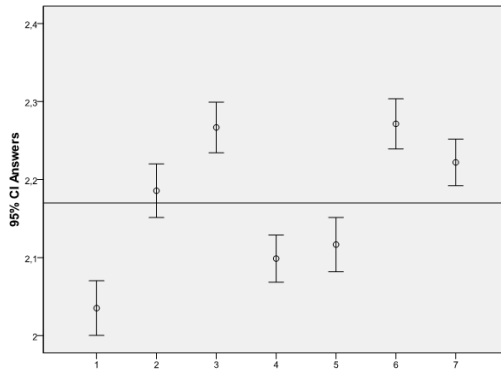
Figure 19. Perceived severity scores (horizontal line is the overall mean score)
1 - Thinking about prostate cancer frightens me; 2 - When I think about prostate cancer, my heart beats faster; 3 - I am afraid to think about prostate cancer; 4 - Prostate cancer would cause me long-term problems; 5 - Prostate cancer would threaten my relationship with my wife (or girlfriend / partner); 6 - If I get prostate cancer, my whole life will change; 7 - If I get prostate cancer, I won't live longer than 5 years.

In an assessment of the relationship between social groups and the perceived severity of prostate cancer, no statistically significant difference was observed in responses to all the section's questions. Perceived severity was more strongly expressed in social groups of blue-collar workers and the unemployed. Blue-collar workers agreed more strongly than others with the following statements: 'When I think about prostate cancer, my heart beats faster' (2.21 points); 'I am afraid to think about prostate cancer' (2.30 points); 'Prostate cancer would cause me long-term problems' (2.17 points); and 'If I get prostate cancer, I won't live longer than 5 years' (2.25 points). Most unemployed men agreed with the following statements: 'Prostate cancer would threaten my relationship with my wife (or girlfriend / partner)' (2.20 points) and 'If I get prostate cancer, my whole life will change' (2.37 points).

When comparing perceived severity in the context of education levels, a statistically significant difference was found in responses to the following statements: 'Prostate cancer would cause me long-term problems' ($F_{(5.1836)} = 9.011$, P = 0.0001); and 'Prostate cancer would threaten my relationship with my wife' ($F_{(5.1836)} = 3.530$, P = 0.004).

Perceived severity that causes fear was more common among men with a primary education (2.23 and 2.25 points respectively). Men with unfinished secondary or unfin-

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ished vocational education were more concerned than others that they wouldn't live longer than 5 years if they get prostate cancer (2.28 points).

In an analysis of the relationship between marital status and perceived severity, no statistically significant difference was observed in responses to all the section's questions. However, perceived severity tended to be more strongly expressed by men who are divorced, unmarried or widowers, or who live separately from their spouses.

V. Champion argues that perceived susceptibility and perceived severity are threats that should encourage health-protecting behavior. These factors cause fear, the main cause of a threatened feeling that makes one appreciate the benefits and effectiveness of health-protecting behavior. The intensity of fear may cause a positive, negative or vacillating psychological response, depending on the attitudes towards cancer screening program and health-protecting behavior. Too great a fear might prevent a man from participating in the screening program, while a lack of fear may fail to motivate him to attend. Medium-level fear would be the best motivator, encouraging a person to take actions to reduce the risk of contracting the disease.

The prevention program's perceived benefits were assessed by asking men to provide their opinion on the necessity of prostate-specific antigen (PSA), digital prostate exam and prostate biopsy procedures (Fig. 20). The level of perceived benefits was fairly high in responses to all questions, with mean scores of answers ranging from 2.27 to 2.72 points. A statistically significant difference was found between mean scores. The highest mean score was found in responses to the statements: 'When I find out that my PSA test results are within the normal limits, I don't worry much about prostate cancer' (2.72 points) and 'When the recommended PSA test is completed, I feel good about myself' (2.69 points); the lowest score was found in responses to the statement 'When the recommended digital exam is completed, I feel good about myself' (2.27 points).

The overall mean score in the section on perceived benefits (2.50 points out of 3) was greater than that in the sections on perceived susceptibility (1.81 points; $F_{(4.9205)}$ = 18.826, P = 0.0001) and perceived severity (2.16 points; $F_{(6.12887)}$ = 28.984, P = 0.0001).
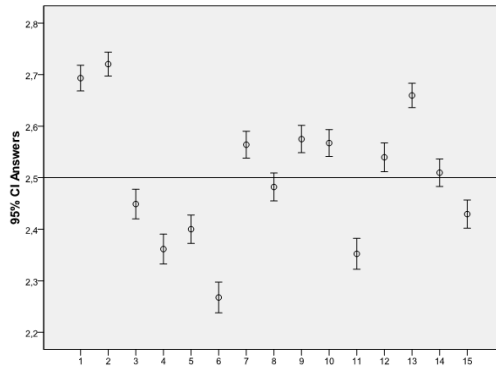
Figure 20. Perceived benefits scores (horizontal line is the overall mean score)

1 - When the recommended PSA test is completed, I feel good about myself; 2 - When I find out that my PSA test results are within the normal limits, I don't worry much about prostate cancer; 3 - Participating in PSA will allow me to detect prostate cancer early; 4 - If I participate in PSA screening, it will decrease my chance of dying from prostate cancer; 5 - If I participate in PSA screening, major surgery becomes less likely; 6 - When the recommended digital exam is completed, I feel good about myself; 7 - When the results of the digital exam are positive (favorable to me), I don't worry much about prostate cancer; 8 – Undergoing a digital exam will allow me to detect prostate cancer early; 9 – If I undergo a digital exam, it will decrease my chance of dying from prostate cancer; 10 - If I undergo a digital exam, major surgery becomes less likely; 11 - When the recommended prostate biopsy is completed, I feel good about myself; 12 - When the results of a prostate biopsy are positive (favorable to me), I don't worry much about prostate cancer; 13 - Undergoing a prostate biopsy will allow me to detect prostate cancer early; 14 - If I undergo a prostate biopsy, it will decrease my chance of dying from prostate cancer; 15 - If I undergo a prostate biopsy, major surgery becomes less likely.

In assessing the relationship between social groups and perceived benefits, a statistically significant difference was observed between mean scores in responses to the following two statements (out of seven in the section): 'If I participate in PSA screening it will decrease my chance of dying from prostate cancer' ($F_{(4.1837)} = 5.351$, P = 0.0001) and 'If I undergo a digital exam major surgery becomes less likely' ($F_{(4.1837)} = 5.317$, P = 0.0001).

The perceived benefits were more strongly expressed in the unemployed social group. The unemployed agreed more often than others with the statements: 'When I find out that my PSA test results are within the normal limits, I don't worry much about prostate cancer' (2.74 points); 'Participating in PSA screening will allow me to detect prostate cancer early' (2.49 points); 'If I participate in PSA screening, major surgery becomes less likely' (2.62 points); 'When the recommended digital exam is completed, I feel good about myself' (2.33 points); and 'If I undergo a prostate biopsy, major surgery

becomes less likely' (2.50 points). White-collar workers agreed more often than others with the following statements: 'If I participate in PSA screening, it will decrease my chance of dying from prostate cancer' (2.44 points); 'Undergoing a digital exam will allow me to detect prostate cancer early' (2.45 points); 'When the recommended prostate biopsy is completed, I feel good about myself' (2.35 points); and 'If I undergo a prostate biopsy, it will decrease my chance of dying from prostate cancer' (2.62 points). Pensioners agreed more often than others with the statements: 'When the recommended PSA test is completed, I feel good about myself' (2.73 points); 'If I undergo a digital exam, it will decrease my chance of dying from prostate cancer' (2.65 points); 'When the results of a digital exam are positive (favorable to me), I don't worry much about prostate cancer' (2.55 points); and 'When the results of a prostate biopsy are positive (favorable to me), I don't worry much about prostate cancer' (2.47 points). Blue-collar workers agreed more often than others with the statement: 'If I undergo a digital exam, major surgery becomes less likely' (2.74 points). The statement 'Undergoing prostate biopsy will allow me to detect prostate cancer early' was most favored by disabled men (2.38 points).

The level of perceived benefits from participating in prostate screening was fairly high across all education level groups (the mean scores of answers varied from 2.17 to 2.80 points). Statistically significant differences in relation to the level of education were observed in responses to the following statements: 'When I find out that my PSA test results are within the normal limits, I don't worry much about prostate cancer' ($F_{(5.1836)}$ = 3.268, P = 0.006); 'Participating in PSA screening will allow me to detect prostate cancer early' ($F_{(5.1836)}$ = 3.890, P = 0.002); 'If I participate in PSA screening, it will decrease my chance of dying from prostate cancer' ($F_{(5.1836)}$ = 8.152, P = 0.0001); 'If I participate in PSA screening, major surgery becomes less likely' ($F_{(5.1836)}$ = 2.414, P = 0.034); 'When the results of a digital exam are positive (favorable to me), I don't worry much about prostate cancer' ($F_{(5.1836)}$ = 3.830, P = 0.002); 'If I undergo a digital exam, it will decrease my chance of dying from prostate cancer' ($F_{(5.1836)}$ = 3.058, P = 0.009); 'If I undergo a digital exam, major surgery becomes less likely' ($F_{(5.1836)}$ = 6.155, P = 0.0001); 'When the recommended prostate biopsy is completed, I feel good about myself' ($F_{(5.1836)}$ = 4.218, P = 0.001); 'If I undergo a prostate biopsy, it will decrease my chance of dying from prostate cancer' ($F_{(5.1836)}$ = 7.105, P = 0.0001). The benefits of participating in screening for prostate cancer were most appreciated by respondents with unfinished sec-

ondary education: more often than others, they felt good about themselves when the PSA test was completed (2.80 points), thought that participating in PSA screening would allow them to detect prostate cancer early (2.67 points), that they would feel good about themselves when the recommended digital exam and prostate biopsy were completed (2.37 and 2.49 points respectively) and that major surgery would be less likely if they underwent a digital exam (2.75 points). Men with higher or unfinished higher education said that if they participate in PSA screening, it will decrease their chances of dying from prostate cancer (2.43 and 2.45 points for men with higher and unfinished higher education respectively); that when the results of a digital exam are positive (favorable to them), they don't worry much about prostate cancer (2.60 and 2.68 points respectively); that undergoing a digital exam will decrease their chances of dying from prostate cancer (2.70 and 2.72 points) and that if they find that the results of prostate biopsy are positive (favorable to them), they don't worry much about prostate cancer (2.54 and 2.47 points).

In analyzing the relationship between marital status and perceived benefits of participating in prostate screening, no statistically significant difference was observed in responses to all the section's questions. However, responses to statements on perceived benefits were more positively expressed among single men; among men who live separately from their spouse, the score was as high as 3 points in responses to most questions.

Perceived benefits and perceived barriers to participation in the prevention program are critical components of the questionnaire. Perceived benefits refer to men's belief that prostate cancer can be detected early and successfully treated. Perceived barriers are barriers that stop men from taking actions to protect themselves from prostate cancer, such as fear of cancer or its treatment, financial problems, sexual dysfunction or pain.

The most common barriers preventing men from participating in prostate screening program were the following beliefs: that undergoing a prostate biopsy would be too painful (with a mean score of 2.39 points) and embarrassing (2.29 points) and that undergoing a digital exam would be too painful (2.20 points) and embarrassing (2.21 points). Barriers such as the expense of tests and the amount of time they would take were less important (Fig. 21). Perceived barriers were less important to respondents (with an overall mean score of 1.97 points out of 3) than the perceived severity of prostate cancer (2.17 points; $F_{(6.12887)} = 28.984$, $P = 0.0001$) and perceived benefits (2.50 points;

$F_{(14.27615)} = 87.573$, $P = 0.0001$), but more important than perceived susceptibility to prostate cancer (1.81 points; $F_{(4.9205)} = 18.826$, $P = 0.0001$).
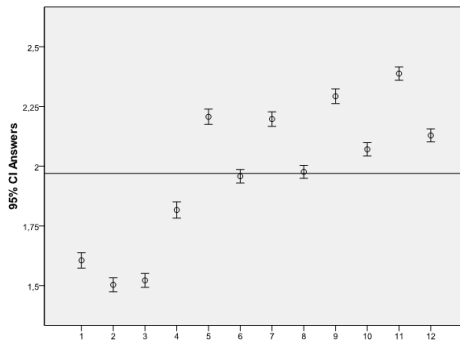

Figure 21. Perceived barriers scores (horizontal line is the overall mean score)

1 - PSA screening will be embarrassing for me; 2 - PSA screening will take too much time; 3 – PSA screening will be too painful; 4 – PSA screening is too expensive; 5 – A digital exam will be embarrassing for me; 6 – A digital exam will take too much time; 7 – A digital exam will be too painful; 8 – A digital exam is too expensive; 9 – A prostate biopsy will be embarrassing for me; 10 – A prostate biopsy will take too much time; 11 – A prostate biopsy will be too painful; 12 - A prostate biopsy is too expensive.

In an assessment of the relationship between social groups and perceived barriers to participation in the prevention program, statistically significant differences were observed between mean scores in responses to the following statements: 'PSA screening will be too painful' ($F_{(4.1836)} = 5.083$, $P = 0.0001$); 'A digital exam will be embarrassing for me' ($F_{(4.1836)} = 1.849$, $P = 0.001$); 'A digital exam will take too much time' ($F_{(4.1836)} = 2.588$, $P = 0.035$); 'A digital exam will be too painful' ($F_{(4.1836)} = 3.827$, $P = 0.004$); 'A prostate biopsy will be embarrassing for me' ($F_{(4.1836)} = 2.845$, $P = 0.023$); and 'A prostate biopsy will be too painful' ($F_{(4.1836)} = 4.287$, $P = 0.002$). Across all social groups, responses to statements on perceived barriers were less positive than those on perceived severity of prostate cancer and benefits – mean scores were lower than 2 points out of 3. Responses to statements on perceived barriers were least strongly expressed in the unemployed and disabled social groups. Statements about barriers were most favored by

white-collar workers (with mean scores from 2.22 to 2.32 points) and white-collar workers (from 1.65 to 2.28 points).

When comparing perceived barriers in the context of education levels, statistically significant differences were found in responses to the following statements: 'PSA screening will be too painful' ($F_{(5.1836)}$ = 7.783, P = 0.0001); 'A digital exam will be embarrassing for me' ($F_{(5.1836)}$ = 9.007, P = 0.001); 'A digital exam will take too much time' ($F_{(5.1836)}$ = 6.297, P = 0.0001); 'A digital exam will be too painful' ($F_{(5.1836)}$ = 13.898, P = 0.0001); 'A prostate biopsy will be embarrassing for me' ($F_{(5.1836)}$ = 9.900, P = 0.0001); 'A prostate biopsy will take too much time' ($F_{(5.1836)}$ = 7.373, P = 0.0001); and 'A prostate biopsy will be too painful' ($F_{(5.1836)}$ = 4.468, P = 0.0001). Most barriers to participation in prostate cancer screening were perceived by respondents with a primary or further education.

In an analysis of the relationship between marital status and perceived barriers to participation in prostate cancer screening, no statistically significant difference was observed in responses to all the section's questions. However, a trend was observed that barriers were more often perceived by single men who live separately from their spouses. They responded more often than others that PSA screening would be embarrassing (1.75 points), and that it would be too painful (2.75 points) and too expensive (2.25 points), that a digital exam would be embarrassing (2.25 points), and that a prostate biopsy would take too much time (2.25 points) and would be too expensive (2.50 points). Such fears were similarly common among divorced men and widowers.

Responses to statements on health motivation were expressed more strongly than those to statements on any other area (with a mean score of 2.53 points). The most common motivating factor for participation in prostate cancer screening was a desire to discover health problems early (with a mean score of 2.90 points). The least important factors for respondents were regular health check-ups (2.13 points) and searching for new information to improve their health (2.24 points; Fig. 22).
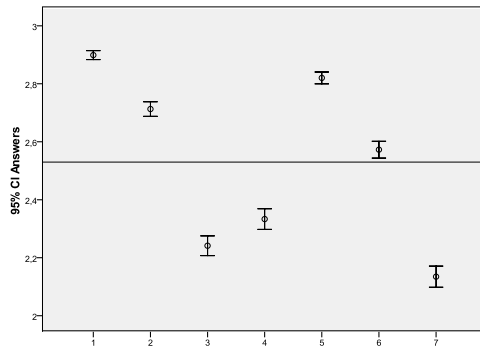
Figure 22. Health motivation scores (horizontal line is the overall mean score)
1 - I want to discover health problems early; 2 - Maintaining good health is extremely important to me; 3 - I search for new information to improve my health; 4 - I feel it is important to carry out activities which will improve my health; 5 - I eat well-balanced meals; 6 - I exercise at least 3 times a week; 7 - I have regular check-ups even when I am not sick.

In an assessment of the relationship between social groups and health motivation, a statistically significant difference was observed between mean scores in responses to the following statement: 'I search for new information to improve my health'. The unemployed were the most keen to do this and white-collar workers the least ($F_{(4.1836)}$ = 3.300, P = 0.010).

White-collar workers were more likely to participate in prevention program and take care of their health: they were convinced more often than others that it is important to discover health problems early (2.91 points), carry out activities to improve their health (2.38 points), eat well-balanced meals (2.84 points), exercise regularly (2.61 points) and have regular check-ups (2.14 points). The unemployed pay particular attention to regular exercise (2.61 points) and blue-collar workers to regular check-ups (2.16 points). Compared with other social groups, regular preventive check-ups were least important to the unemployed (2.02 points).

In an analysis of the relationship between health motivation and respondents' level of education, statistically significant differences were found in responses to the following statements: 'Maintaining good health is extremely important to me' ($F_{(5.1836)}$ = 3.857, P = 0.002) and 'I search for new information to improve my health' ($F_{(5.1836)}$ = 9.202, P = 0.0001). Health motivation was high across all educational levels (a mean score of 2.5 or

more points out of 3 was most common). Respondents with primary education were highly motivated to try and discover health problems early (2.92 points), more convinced than others of the importance of activities to improve their health (2.50 points) and tended to eat well-balanced meals (2.88 points). Men with unfinished secondary education found maintaining good health extremely important (2.84 points) and searched for new information to improve it (2.61 points). Regular exercise was most important to men with a further education (2.63 points).

In an analysis of the relationship between health motivation and marital status, no statistically significant difference was observed in responses to all the section's questions. A trend was observed that health motivation was more strongly expressed among men who are single: men who live separately from their spouse responded more often than others that they think it is very important to discover health problems early (3.00 points), that they search for new information to improve their health (3.00 points), that it is important to carry out activities to improve their health (3.00 points) and that they have regular check-ups even when they are not sick (2.33 points).

An individual's health motivation stimulates a particular course of action when seeking good health. A perceived threat from the disease (susceptibility and severity) and well-understood benefits of preventive measures are the main factors that determine men's disposition towards health and compel them to act to improve it. Scientifically-based information about the success of prostate cancer screening program helps promote them. Health motivation encourages the adoption of a healthy lifestyle (well balanced meals, sufficient exercise), avoidance of health risks (smoking, alcohol abuse) and active participation in immunoprevention.

3.4. Prostate cancer awareness among men and its association with social and demographic factors

3.4.1. Analysis of respondents' social and demographic characteristics

A total of 658 men were included in the prostate cancer awareness survey, with 97.9 per cent living in urban and 2.1 per cent in rural areas. The age of respondents varied from 45 to 79, with a mean age of 59.5 (SD of 6.3). An analysis of respondents' socio-demographic characteristics indicated that most men were married (90.4 per cent) and

that the prevailing level of education was vocational (34 per cent). The proportions of blue-collar and white-collar workers were roughly the same (35.3 and 34.8 per cent respectively; Table 2).

Table 2. Socio-demographical characteristics of respondents

Socio-demographical characteristics	Surveyed group										
	N	%	N	%	N	%	N	%	N	%	N	%
Marital status	married		unmarried		unregistered marriage		divorced		widower		spouse lives separately	
	595	90.4	14	2.1	11	1.7	19	2.9	18	2.7	1	0.2
Education	primary		unfinished secondary		secondary		further		unfinished higher		higher	
	13	2	30	4.6	196	29.8	224	34	36	5.5	159	24.2
Social group	blue-collar worker		white-collar worker		pensioner		disabled		unemployed			
	N	%	N	%	N	%	N	%	N	%		
	232	35.3	229	34.8	139	21.1	41	6.2	17	2.6		

3.4.2. Results of the men's prostate cancer awareness survey

Prostate cancer awareness among men who participated in the survey was assessed using S. P. Weinrich's questionnaire. The questionnaire comprises 12 questions that expose respondents' knowledge about risk factors, clinical symptoms, side-effects from treatment and limitations of prostate cancer screening. It was found that respondents had a medium-level knowledge about prostate cancer and its prevention, as 5-7 questions or even fewer were commonly answered correctly. Most respondents (28 per cent) correctly answered only 4 questions out of 12. A total of 98 respondents (13.5 per cent) gave 5 correct answers, 118 (17.9 per cent) gave 6, 109 (16.6 per cent) gave 7, 71 (10.8 per cent) gave 8 and 45 (6.8 per cent) gave 9. Those with excellent (10 to 12 correct answers) and very poor (2 or 3 correct answers) knowledge about prostate cancer were in the minority: 0.6 to 3.6 per cent and 0.3 to 1.1 per cent respectively.

Total Knowledge Score (TKS) was computed as 12 times the mean of the non missing items. TKS is the same for all 12 questions. Average TKS varied from 5.654 to 6.271. The lowest scores came from the group of respondents not living with family and

the highest, from the white-collar workers group (Table 3). When comparing knowledge about prostate cancer risk factors in the context of age groups (those aged from 45 to 59 (6.084) and 60 to 75 (6.050)), education level (secondary (6.029) and higher (6.091)), marital status (living with a family (6.104) and alone (5.654)) and social groups (blue-collar (5.897) and white-collar (6.271) workers, pensioners (6.129) and others (5.810)), no statistically significant difference was observed (p, the statistical significance of answers, varied between 0.101 and 0.822). However, a trend was observed that somewhat lower total scores prevailed in the social groups of blue-collar workers (5.897), 'others' (5.810) and men who live alone (5.654).

There was no significant variation in average total scores between answers to the first (Q1), third (Q3) and fifth (Q5) questions. Just over half the respondents knew that men who have several family members (blood relatives) with prostate cancer are more likely to get prostate cancer: in relation to socio-demographic characteristics, 46.2 to 61.2 per cent of respondents answered this question correctly. The vast majority of respondents (89.7 to 95.7 per cent) thought incorrectly that younger men are more likely to get prostate cancer than older men.

Table 3. Average total score for knowledge of prostate cancer risk factors and the proportion of correct answers (%) in relation to respondents' social and demographic characteristics

Socio-demographical characteristics	N (%)	Average total score*	Risk factors question number, number of respondents who answered correctly, N (%)		
			Q1	Q3	Q5
Age, years					
45-59	**359** (54.6)	6.084	**206** 57.4 (52.2-62.4)	**332** 92.5(89.4-94.8)	**53** 14.8(11.4-18.7)
60-75	**299** (45.4)	6.050	**175** 58.5(52.9-64.0)	**278** 93.0(89.7-95.5)	**40** 13.4(9.8-17.5)
the statistical significance of answers, p		p=0.822	p=0.767	p=0.807	p=0.612
Education					
Secondary	**239** (36.3)	6.029	**144** 60.3(54.0-66.3)	**215** 90.0(85.7-93.3)	**32** 13.4(9.5-18.1)
Higher	**419** (63.7)	6.091	**237** 56.6(51.8-61.3)	**395** 94.3(91.8-96.2)	**61** 14.6(11.4-18.1)
the statistical significance of answers, p		p=0.690	p=0.357	p=0.401	p=0.679

			Q1	Q3	Q5
Social group					
Blue-collar workers	**232** (35.3)	5.897	**129** 55.6(49.2-61.9)	**213** 91.8(87.8-94.9)	**28** 12.1(8.3-16.7)
White-collar workers	**229** (34.8)	6.271	**136** 59.4(53.0-65.6)	**212** 92.6(88.7-95.5)	**39** 17.0(12.6-22.2)
Pensioners	**139** (21.1)	6.129	**85** 61.2(52.9-69.0)	**133** 95.7(91.4-98.3)	**18** 12.9(8.1-19.2)
Others	**58** (8.8)	5.810	**31** 53.4(40.8-65.8)	**52** 89.7(80.2-95.7)	**8** 13.8(6.6-24.1)
the statistical significance of answers, p		p=0.126	p=0.618	p=0.407	p=0.464
Marital status					
Live with family	**606** (92.1)	6.104	**357** 58.9(55.0-62.8)	**562** 92.7(86.8-91.7)	**87** 14.4(11.7-17.3)
Live alone	**52** (7.9)	5.654	**24** 46.2(33.2-59.5)	**48** 92.3(83.0-97.6)	**6** 11.5(4.8-22.0)
the statistical significance of answers, p		p=0.101	p=0.074	p=0.909	p=0.576

* - Total Knowledge Score (TKS) was computed as 12 times the mean of the non missing items. TKS is the same for all 12 questions

Q1- Men who have several family members (blood relatives) with prostate cancer are more likely to get prostate cancer

Q3- Younger men are more likely to get prostate cancer than older men

Q5- Most 80 year old men do not need prostate cancer screening

There was no significant variation in the average total score between answers to the second (Q2) and the fourth (Q4) questions (Table 4). An analysis indicated that respondents were rather poorly informed about the clinical symptoms of prostate cancer. Just over a third of respondents knew that a man can have prostate cancer without problems or symptoms (36.5 to 46.6 per cent). Even fewer respondents knew that frequent pain in your lower back can often be a sign of prostate cancer (15.5 to 23.6 per cent).

Table 4. Average total score for knowledge of clinical symptoms and the proportion of correct answers (%) in relation to respondents' social and demographic characteristics

Socio-demographical characteristics	N (%)	Prostate cancer symptoms question number, number of respondents who answered correctly, N (%)	
		Q2	Q4
Age, years			
45-59	**359** (54.6)	**147** 40.9(35.9-46.1)	**80** 22.3(18.2-26.8)
60-75	**299** (45.4)	**114** 38.1(32.8-43.7)	**57** 19.1(14.9-23.8)
the statistical significance of answers, p		p=0.462	p=0.311

Education			
Secondary	**239** (36.3)	**96** 40.2(34.1-46.4)	**48** 20.1(15.3-25.5)
Higher	**419** (63.7)	**165** 39.4(34.8-44.1)	**89** 21.2(17.5-25.3)
the statistical signifi-cance of answers, p		p=0.843	p=0.725
Social group			
Blue-collar workers	**232** (35.3)	**85** 36.6(30.6-42.9)	**47** 20.3(15.4-25.7)
White-collar workers	**229** (34.8)	**92** 40.2(34.0-46.6)	**54** 23.6(18.4-29.3)
Pensioners	**139** (21.1)	**57** 41.0(33.1-49.1)	**27** 19.4(13.5-26.5)
Others	**58** (8.8)	**27** 46.6(34.2-59.10)	**9** 15.5(7.8-26.1)
the statistical signifi-cance of answers, p		p=0.538	p=0.521
Marital status			
Live with family	**606** (92.1)	**242** 39.9(36.1-43.9)	**126** 20.8(17.7-24.1)
Live alone	**52** (7.9)	**19** 36.5(24.5-49.9)	**11** 21.2(11.7-33.3)
the statistical signifi-cance of answers, p		p=0.631	p=0.951

Q2- A man can have prostate cancer and have no problems or symptoms
Q4- Frequent pain often in your lower back could be a sign of prostate cancer

There was no significant variation in average total score between answers to the sixth (Q6), seventh (Q7) and eighth (Q8) questions (Table 5). An analysis indicated that respondents were rather poorly informed about the side-effects of prostate cancer treatment. Less than a third of respondents knew that some treatments for prostate cancer can make it harder for men to control their urine (21.2 to 30.9 per cent) and may cause problems with a man's ability to have sex (17.2 to 31.9 per cent). However, most respondents knew that treatments for prostate cancer will not stop a man from ever driving a car again (93.4 to 98.1 per cent). Even though no significant variation in average total score was observed between answers, a trend emerged of less knowledge about the side-effects of prostate cancer treatment among people who live alone (21.2 to 23.1 per cent) or belong to the 'other' social group (17.2 to 27.6 per cent).

Table 5. Average total score for knowledge of prostate cancer side-effects and the proportion of correct answers (%) in relation to respondents' social and demographic characteristics

Socio-demographical characteristics	N (%)	Side-effects from treatment question number, number of respondents who answered correctly, N (%)		
		Q6	Q7	Q8
Age, years				
45-59	**359** (54.6)	**94** 26.2(21.8-30.9)	**93** 25.9(21.6-30.6)	**344** 95.8(93.4-97.6)
60-75	**299** (45.4)	**87** 29.1(24.2-1.4)	**85** 28.4(23.5-33.7)	**282** 94.3(91.3-96.6)
the statistical significance of answers, p		p=0.405	p=0.468	p=0.371
Education				
Secondary	**239** (36.3)	**66** 27.6(22.2-33.5)	**59** 24.7(19.5-30.4)	**231** 96.7(93.8-98.5)
Higher	**419** (63.7)	**115** 27.4(23.3-31.8)	**119** 28.4(24.2-32.8)	**395** 94.3(91.8-96.2)
the statistical significance of answers, p		p=0.963	p=0.302	p=0.172
Social group				
Blue-collar workers	**232** (35.3)	**61** 26.3(20.9-32.2)	**55** 23.7(18.6-29.4)	**222** 95.7(92.5-97.8)
White-collar workers	**229** (34.8)	**61** 26.6(21.2-32.6)	**73** 31.9(26.1-38.1)	**214** 93.4(89.8-96.2)
Pensioners	**139** (21.1)	**43** 30.9(23.7-38.9)	**40** 28.8(21.7-36.6)	**134** 96.4(92.4-98.7)
Others	**58** (88)	**16** 27.6(17.3-39.7)	**10** 17.2(9.1-28.2)	**56** 96.6(89.5-99.4)
the statistical significance of answers, p		p=0.782	p=0.070	p=0.514
Marital status				
Live with family	**606** (92.1)	**170** 28.1(24.6-31.7)	**166** 27.4(23.9-31.0)	**575** 94.9(92.9-96.5)
Live alone	**52** (7.9)	**11** 21.2 (11.7-33.3)	**12** 23.1(13.2-35.5)	**51** 98.1(91.3-99.9)
the statistical significance of answers, p		p=0.285	p=0.501	p=0.304

Q6- Some treatments for prostate cancer can make it harder for men to control their urine
Q7- Some treatments for prostate cancer can cause problems with a man's ability to have sex
Q8- Some treatments for prostate cancer can stop a man from ever driving a car again

There was no significant variation in average total score between answers to the ninth (Q9), tenth (Q10), eleventh (Q11) and twelfth (Q12) questions (Table 6). Most respondents knew that an abnormal Prostate-Specific Antigen (PSA) blood test does not mean they definitely have cancer (84.2 to 93.2 per cent) and that doctors cannot tell which men may die from prostate cancer and which will remain unharmed by it (94.2 to 96.1 per cent).

Table 6. Average total score for knowledge about limitations of prostate cancer screening and the proportion of correct answers (%) in relation to respondents' social and demographic characteristics

Socio-demographical characteristics	N (%)	Limitations of prostate cancer screening question number, number of respondents who answered correctly, N (%)			
		Q9	Q10	Q11	Q12
Age, years					
45-59	**359** (54.6)	**342** 95.3(92.7-97.1)	**324** 90.3(86.9-93.0)	**35** 9.7(7.0-13.1)	**134** 37.3(32.4-42.4)
60-75	**299** (45.4)	**286** 95.7(92.9-97.6)	**261** 87.3(83.2-90.7)	**37** 12.4(9.0-16.4)	**107** 35.8(30.5-41.3)
the statistical significance of answers, p		p=0.812	p=0.229	p=0.283	p=0.683
Education					
Secondary	**239** (36.3)	**228** 95.4(92.2-97.6)	**213** 89.1(84.8-92.6)	**30** 12.6(8.8-17.1)	**79** 33.1(30.5-41.3)
Higher	**419** (63.7)	**400** 95.5(93.2-97.2)	**372** 88.8(85.5-91.6)	**42** 10.0(7.4-13.1)	**162** 38.7(34.1-43.4)
the statistical significance of answers, p		p=0.968	p=0.894	p=0.318	p=0.151
Social group					
Blue-collar workers	**232** (35.3)	**219** 94.4(90.9-96.9)	**209** 90.1(85.8-93.5)	**26** 11.2(7.6-15.7)	**74** 31.9(26.1-38.1)
White-collar workers	**229** (34.8)	**220** 96.1(93.0-98.1)	**205** 89.5(85.1-93.0)	**24** 10.5(7.0-14.9)	**106** 46.3(39.9-52.7)
Pensioners	**39** (21.1)	**134** 96.4(92.4-98.7)	**117** 84.2(77.5-89.6)	**17** 12.2(7.5-18.3)	**47** 33.8(26.3-41.9)
Others	**58** (8.8)	**55** 94.8(87.0-98.7)	**54** 93.2(84.7-97.8)	**5** 8.6(3.2-17.6)	**14** 24.1(14.5-36.0)
the statistical significance of answers, p		p=0.769	p=0.203	p=0.891	p=0.063
Marital status					
Live with family	**606** (92.1)	**579** 95.5(93.7-97.0)	**539** 88.9(86.3-91.3)	**70** 11.6(9.2-14.3)	**226** 37.3(33.5-41.2)
Live alone	**52** (7.9)	**49** 94.2(85.6-98.6)	**46** 88.5(78.0-95.2)	**2** 3.8(0.6-11.6)	**15** 28.8(17.9-41.8)
the statistical significance of answers, p		p=0.663	p=0.915	p=0.088	p=0.225

Q9- Doctors can tell which men may die from prostate cancer and which men will not be harmed by prostate cancer

Q10- An abnormal Prostate-Specific Antigen (PSA) blood test means I have cancer for sure

Q11- I can have cancer and have a normal PSA blood test

Q12- Prostate cancer may grow slowly in some men

Respondents had very poor understanding of the fact that even if their Prostate-Specific Antigen (PSA) test is normal, they can have prostate cancer (3.8 to 12.6 per cent). Roughly a third of respondents knew that prostate cancer may grow slowly in some men (24.1 to 46.3 per cent). Even though there was no significant variation in average total score between the answers, a trend emerged of less knowledge about the limitations of prostate cancer screening in responses to questions 11 and 12 among people who live alone (3.8 to 28.8 per cent) and those who belong to the 'other' social group (8.6 to 24.1 per cent).

CONCLUSIONS

1. Between 1998 and 2007, several periods with different rates of change in prostate cancer incidence and mortality were observed. Levels of prostate cancer incidence and mortality grew at similar rates between 2005 and 2007. During the thirty-year period analyzed, the number of newly-diagnosed prostate cancer cases grew in the age categories of men under 54 and from 55 to 74, while there was a twofold decrease in men aged 75 and older. In the aforementioned age categories, the trends of prostate cancer mortality corresponded to trends in prostate cancer incidence. In assessing two factors, the effect of age was three times as important as the effect of period and five times the effect of cohort.

2. A statistically significant positive association was found between the incidence of prostate cancer and funding received for the prevention program, indicating that more new prostate cancer cases are diagnosed in municipalities that absorbed more funding. However, 25 per cent of municipalities showed a trend uncharacteristic in Lithuania of no relationship between funding and newly-diagnosed cases of prostate cancer.

3. The level of health beliefs among men who participated in prostate cancer screening was fairly high (2.2 points out of 3), with health motivation (2.53 points) and perceived benefits (2.50) expressed most strongly. In the context of social and demographic factors, social status and education level affected health beliefs most: the most health-conscious men were white-collar workers and the least health-conscious were the unemployed. Perceived susceptibility to prostate cancer, severity and barri-

ers to participating in prostate cancer screening were most strongly expressed among men with less education.

4. The level of knowledge among men about prostate cancer risk factors, clinical symptoms, side-effects from treatment and the limitations of screening for prostate cancer were medium. The lowest level of knowledge was among respondents living without family and the highest in the group of white-collar workers. The average total score for prostate cancer awareness showed no statistically significant differences in relation to age groups, education level, marital status or social groups.

PRACTICAL RECOMMENDATIONS

We recommend further observation of the trends of prostate cancer incidence, in order to discern trends in mortality reduction that will indicate effective screening.

Observed disparities between prostate cancer incidence and program funding indicated that the number of newly-diagnosed cases in some municipalities does not depend on the level of funding. It is necessary to find the causes of this situation.

We recommend using V. Champion's health beliefs questionnaire in prevention programs, as a scientifically valid and reliable tool to assess health beliefs and to anticipate attitudes towards cancer screening program and behavior during screening.

When organizing oncology disease screening programs, one must take into account the fact that willingness to participate in such programs depends on the knowledge people have about the particular problem – the better informed they are, the more likely they are to attend a screening. Prostate cancer screening would be more successful if men had more reliable information about the problem. Community nurses could be given an important role in the dissemination of such knowledge.

LIST OF PUBLISHED WORKS ON THE THEME OF THE DISSERTATION

1. Čepanauskienė* R., Kalibatienė D. Sveikatos įsitikinimų modelio taikymas priešinės liaukos vėžio ankstyvo diagnozavimo programoje. Medicinos teorija ir praktika 2010;4(16):484-489.

2. Čepanauskienė* R., Kalibatienė D., Gurevičius R. Vyrų požiūrio į ankstyvą prostatos vėžio diagnostiką sąsajos su sveikatos įsitikinimais. Sveikatos mokslai 2011;6(78):93-103.

3. Čepanauskienė* R., Gurevičius. R. Amžiaus-periodo-kohortos faktoriai ir jų tarpusavio įtaka sergamumo prostatos vėžiu dinamikai Lietuvoje 1979-2008 m. Gerontologija 2011;12(3):143–150.

4. Šturienė R., Kalibatienė D., Gurevičius R. Vyrų žinių apie prostatos vėžį ir jo profilak-tiką sąsajos su socialiniais ir demografiniais požymiais. Visuomenės sveikata 2012/1(56):62-72.
   * now Šturienė

Presentations:

1. 'The relationship between the incidence of prostate cancer and the funding for the secon-dary prevention program in 60 Lithuanian municipalities, 2006-2008', 3rd national scien-tific conference 'Science for Human Health', 17 April 2010, Kaunas.

2. 'Prostate cancer incidence and mortality trends in Lithuania', national scientific-practical conference for nursing specialists 'Nursing Science and Practice 2010', 30 April 2010, Vilnius.

3. 'Men's health beliefs in connection with participation in the prostate cancer screening program', international conference 'Science and art of nursing: topical issues', 30 Sep-tember 2011, Klaipėda.

CURRICULUM VITAE

Surname:	Šturienė
Name:	Renata
Date of Birth:	04/05/1972
Nationality:	Lithuanian
Education:	Higher (university)
Education history:	
1980 – 1987	49th Secondary School, Vilnius
1987 – 1990	Vilnius Higher School of Medicine (now Faculty of Health Care, Vilniaus Kolegija/University of Applied Sciences). Qualified as a nurse.
1991 – 1995	Kaunas Medical Academy Faculty of Nursing (now Kaunas University of Medicine). Qualified as a certified nurse.
2001 – 2003	Vilnius University Faculty of Medicine. Master studies in nursing. Obtained Master's degree in Rehabilitation and Nursing.
2008 – 2012	Doctorate student in Public Health, Vilnius University Faculty of Medicine.
Work experience:	
1996 – Present	Vilnius University Faculty of Medicine, Department of Nursing and Fundamentals of Internal Medicine, Assistant.
1995 – Present	Šeškinė Outpatient Clinic, Public Institution, Deputy Director of Nursing.
Scientific activity (fields of research):	Teaching activity (courses offered):
Estimation Patient care of Quality. Prostate cancer secondary prevention programs, organizational features and efficiency.	Health of family and community. Care of community.

SERGAMUMO PROSTATOS VĖŽIU IR MIRTINGUMO NUO JO YPATUMAI LIETUVOJE BEI VYRŲ NUOSTATOS, SKATINANČIOS DALYVAVIMĄ PROSTATOS VĖŽIO PATIKROS PROGRAMOJE

REZIUMĖ

Darbo aktualumas

Prostatos vėžys šiuo metu yra dažniausias vyrų piktybinis navikas Lietuvoje. 2009 m., remiantis Lietuvos vėžio registro duomenimis, jis sudarė 32,9 proc. visų vyrų navikų. Nustatyti patys sparčiausi sergamumo šiuo piktybiniu naviku didėjimo tempai: nuo 1995 metų (563 atvejai) iki 2005 metų (2005 atvejai), o 2007 metais prostatos vėžys sudarė net 40 proc. naujai diagnozuotų vyrų piktybinių navikų (3638 nauji atvejai). Daugėjant diagnozuojamų susirgimų, didėjo ir sergamumo rodikliai. 1995–2007 metais sergamumas prostatos vėžiu vidutiniškai didėjo 17,4 proc. kasmet.

Sergamumo prostatos vėžiu didėjimas siejamas su tobulėjančiais diagnostikos metodais, prostatos specifinio antigeno tyrimo paplitimu klinikinėje praktikoje, įtraukimu į ankstyvos diagnostikos programas jaunesnio amžiaus vyrų. Ankstyvas prostatos vėžio diagnozavimas ir nauji efektyvūs gydymo metodai gerokai pagerino susirgusių vyrų išgyvenamumą, kurio didėjimui įtakos taip pat gali turėti ir kiti veiksniai, pvz., amžius, diagnozės nustatymo laikotarpis, ligos stadija diagnozės nustatymo metu.

Atliekant profilaktinius patikrinimus diagnozuojama daugiau ankstyvų stadijų navikų, mažėja metastazavusios ir vietiškai išplitusios ligos atvejų. Taikant profilaktinės patikros programas, anksčiau nustatomas prostatos vėžys, tad didesniam pacientų skaičiui (padidėja nuo 67 proc. iki 92 proc.) galima skirti radikalų gydymą, ilgėja išgyvenamumas.

Sėkmingam ligų prevencinių priemonių įgyvendinimui svarbiausia gyventojų nusiteikimas dalyvauti profilaktinėse programose. Žmonių nusiteikimą sveikatai ir elgesį sveikatos labui lemia biologiniai, socialiniai, ekonominiai ir kultūriniai veiksniai, kuriems priklauso etniniai ypatumai, genetinė predispozicija, amžius, išsilavinimas, ekonominė padėtis, gyvenimo būdas ir sveikatos įsitikinimai.

Siekiant sumažinti sveikatos skirtumus, labai svarbu suvokti socioekonominės ir kultūrinės aplinkos vaidmenį tam tikram su sveikata susijusiam žmonių elgesiui. Santy-

kio tarp šios aplinkos ir onkoprofilaktinės patikros supratimas svarbus kuriant tinkamą ir efektyvią vėžio prevenciją bei kontrolę.

Darbo tikslas ir uždaviniai

Darbo tikslas − kompleksiškai išanalizuoti prostatos vėžio dažnio tendencijas Lietuvoje laike ir erdvėje, nustatyti jų ryšį su antrinės profilaktikos priemonėmis, bei įvertinti vyrų sveikatos įsitikinimų nuostatas ir nusiteikimą dalyvauti organizuotos patikros programoje.

Siekiant darbo tikslo iškelti tokie uždaviniai:

5. Atskleisti sergamumo prostatos vėžiu ir mirtingumo nuo jo tendencijas Lietuvoje įvairiose amžiaus kategorijose ir kohortose.

6. Nustatyti galimą ryšį, jo pobūdį ir stiprumą tarp sergančiųjų prostatos vėžiu ir organizuotos patikros programų aktyvumo šalies savivaldybėse.

7. Įvertinti vyrų, dalyvavusių prostatos vėžio ankstyvos diagnostikos programoje, sveikatos įsitikinimų nuostatas ir nusiteikimą dalyvauti patikroje, jų sąsajas su socialiniais ir demografiniais veiksniais.

8. Nustatyti vyrų informuotumą apie prostatos vėžį kaip vieną iš svarbesnių veiksnių, skatinančių dalyvauti ankstyvos patikros programoje, analizuojant jų žinias apie ligos rizikos veiksnius, klinikinius požymius, gydymo pasekmes, ištyrimo galimybes ir jų sąsajas su socialiniais ir demografiniais veiksniais.

Darbo mokslinis naujumas

Darbe išsamiau išanalizuotas sergamumo prostatos vėžiu, mirtingumo nuo jo ir kumuliacinės rizikos rodiklių dinamika Lietuvoje panaudojant segmentinės regresijos, amžiaus-periodo-kohortos metodus, sugretinant šiuos populiacinės statistikos rodiklius.

Panaudojus šiuolaikinę aprašomosios epidemiologijos ir kartografavimo metodologiją nustatyti sergamumo prostatos vėžiu ir antrinės profilaktikos programos finansavimo paplitimo netolygumai, šių indikatorių ryšys, jo pobūdis ir stiprumas tarp 50–74 metų amžiaus vyrų 60-yje Lietuvos savivaldybių.

Išanalizuoti mūsų šalies vyrų, dalyvavusių prostatos vėžio ankstyvos diagnostikos programoje, sveikatos įsitikinimai ir jų sąsajos su socialiniais ir demografiniais veiksniais. Šiam tikslui pirmą kartą prostatos vėžio atveju Lietuvoje pritaikytas V. Champion

klausimynas, skirtas tirti vyrų sveikatos įsitikinimus ir nuostatas dalyvauti prostatos vėžio ankstyvos profilaktikos programoje.

Įvertintos vyrų, dalyvavusių prostatos vėžio ankstyvos diagnostikos programoje, žinios apie priešinės liaukos vėžį, pritaikant S.P. Weinrich ir bendr. klausimyną, atskleistos šių žinių sąsajos su socialiniais ir demografiniais veiksniais.

Disertacijos struktūra ir apimtys. Darbą sudaro pagrindiniai skyriai: įvadas, literatūros apžvalga, tyrimo medžiaga ir metodai, rezultatai, rezultatų aptarimas, išvados ir praktinės rekomendacijos; 32 lentelės ir 24 paveikslai. Įvade bendrais bruožais pateikiama tiriamoji problema, tyrimo tikslas ir įvardijami iškelti uždaviniai, darbo mokslinis naujumas. Literatūros apžvalgoje aprašoma prostatos vėžio problema pasaulyje ir Lietuvoje, sergamumo prostatos vėžiu, išgyvenamumo ir mirtingumo nuo jo ypatumai pasaulyje ir Lietuvoje, sveikatos įsitikinimų modeliai ir sveikatos nuostatos, V. Champion modelio taikymas, žinių apie prostatos vėžį ir jo organizuotą patikrą sąsajos su vyrų nuostatomis dalyvauti profilaktinėse programose. Skyriuje „Tyrimo medžiaga ir metodai" aprašoma tiriamoji populiacija, tyrimo metodai, tyrimo eiga, duomenų statistinė analizė. Rezultatų skyriuje pateikiami gauti tyrimo rezultatai, nurodomas jų statistinis patikimumas. Rezultatų aptarimo skyriuje gauti tyrimo rezultatai įvertinami ir lyginami su kitų tyrėjų duomenimis. Darbo pabaigoje, atsižvelgiant į darbe iškeltus uždavinius, apibendrinami tyrimo rezultatai ir pateikiamos išvados ir praktinės rekomendacijos. Disertacijos pabaigoje pateikiamas literatūros sąrašas, kuriame 193 bibliografiniai šaltiniai.

Atlikus tyrimą ir išanalizavus gautus rezultatus, padarytos šios išvados:

1998–2007 m. užfiksuoti skirtingi sergamumo prostatos vėžiu ir mirtingumo nuo jo kitimo tempų periodai. 2005–2007 metais ir sergamumas, ir mirtingumas didėja panašiais tempais. Analizuojamu 30 metų periodu naujai išaiškintų prostatos vėžio atvejų didėjo iki 54 m. ir 55–74 m. amžiaus kategorijose, o 75 m. ir vyresnių sumažėjo perpus. Mirtingumo nuo prostatos vėžio dinamika atitinka sergamumo tendencijas minėtose amžiaus kategorijose. Vertinant du faktorius, atsakingus už sergamumo dinamiką, amžiaus įtaka buvo 3 kartus svarbesnė už periodą ir 5 kartus didesnė už kohortos.

Tarp sergamumo prostatos vėžiu ir profilaktikos programai panaudotų lėšų nustatytas vidutinio stiprumo, statistiškai reikšmingas teigiamas ryšys, rodantis, jog savivaldybėse,

panaudojusiose daugiau lėšų, daugiau išaiškinama prostatos vėžio atvejų. Tačiau ketvirtadalyje savivaldybių aptikta nebūdinga šaliai tendencija, rodanti, kad nėra ryšio tarp naujai išaiškinamų prostatos vėžio atvejų ir finansavimo.

Prostatos vėžio profilaktikos programoje dalyvavusių vyrų sveikatos įsitikinimų lygis buvo gana aukštas (2,2 balo iš 3 galimų), daugiausia buvo išreikštos sveikatos motyvacijos (2,53 balo) ir profilaktinės programos suvoktos naudos (2,50 balo) nuostatos. Be to įtakos turėjo respondentų socialinė padėtis ir išsilavinimas: daugiausia motyvuoti sveikatai buvo tarnautojai, mažiausiai – nedirbantieji; susijusio su liga jautrumo, rimtumo ir kliūčių dalyvauti programoje nuostatos daugiausia pasireiškė tarp žemesnio išsilavinimo vyrų.

Vyrų žinių apie prostatos vėžio rizikos veiksnius, klinikinius simptomus, gydymo pasekmes ir ištyrimo galimybes lygis buvo vidutinis, mažiausias – gyvenančių ne šeimoje tiriamųjų grupėje, o didžiausias – tarnautojų grupėje. Respondentų žinių apie prostatos vėžį bendro balo vidurkis statistiškai reikšmingai nesiskyrė pagal amžiaus grupes, išsilavinimą, šeiminę padėtį ir socialines grupes.

Praktinės rekomendacijos

Rekomenduojame toliau stebėti sergamumo prostatos vėžių dinamiką siekiant nustatyti mirtingumo mažėjimo tendencijas, kaip vieną iš organizuotos patikros efektyvumo rodiklių.

Nustatyti sergamumo prostatos vėžio ir programų finansavimo netolygumai parodė, kad ne visuose savivaldybėse naujų susirgimų išaiškinimas priklauso nuo panaudotų lėšų kiekio, todėl reikia išsiaiškinti šio reiškinio priežastis.

Rekomenduojame V.L. Champion sveikatos įsitikinimų apklausos anketą, kaip moksliškai pagrįstą ir patikimą, taikyti profilaktinių programų praktikoje siekiant nustatyti žmonių nusiteikimą sveikatai ir prognozuoti jų požiūrį į vėžio profilaktines programas ir jų elgesį atrankos metu

Organizuojant onkologinių ligų patikros programas reikėtų atkreipti dėmesį į tai, kad gyventojų dalyvavimas tokiose programose priklauso nuo jų žinių apie problemą lygio – kuo jie daugiau informuoti, tuo daugiau linkę tikrintis sveikatą. Prostatos vėžio atrankos rezultatai galėtų būti geresni, jei vyrai turėtų daugiau teisingos informacijos apie problemą. Šių žinių sklaidoje svarbų vaidmenį galėtų suvaidinti bendruomenės slaugytojai.

Gyvenimo ir mokslinės veiklos aprašymas

Pavardė:	Šturienė
Vardas:	Renata
Gimimo data:	1972 05 04
Pilietybė:	Lietuvos
Išsimokslinimas:	aukštasis universitetinis
Mokymosi įstaigos:	
1980–1987 m.	49 vidurinė mokykla, Vilnius
1987–1990 m	Vilniaus aukštesnioji medicinos mokykla. Įgyta medicinos sesers specialybė.
1991–1995 m.	Kauno medicinos akademija, Slaugos fakultetas. Įgyta diplomuotos medicinos sesers (slaugytojos) specialybė.
2001–2003 m.	Vilniaus universitetas Medicinos fakultetas. Slaugos magistrantūros studijos. Įgytas reabilitacijos ir slaugos magistro laipsnis.
2008–2012 m.	VU Medicinos fakulteto Visuomenės sveikatos krypties doktorantė.
Darbo patirtis:	
Nuo 1996 m. iki dabar	VU Medicinos fakulteto Slaugos ir vidaus ligų pagrindų katedra, asistentė.
Nuo 1995 m. iki dabar	Viešoji įstaiga Šeškinės poliklinika, Direktoriaus pavaduotoja slaugai.
Veiklos sritis, nurodyta licencijoje:	
Bendrosios praktikos slaugytoja.	
Mokslinė ir pedagoginė veikla:	
mokslinių interesų kryptys	dėstomi dalykai
Ligonių priežiūros kokybės įvertinimas. Prostatos vėžio antrinės profilaktikos programos organizaciniai ypatumai ir efektyvumas.	Bendruomenės slauga. Šeimos ir bendruomenės sveikata.