

## Characteristics of Prostate Cancer Screening Management in Tbilisi

Mari Tvaliashvili<sup>1</sup>, Tamar Lobjanidze<sup>2</sup>, Vasil Tkeshelashvili<sup>3</sup>

The University of Georgia, School of Health Sciences and Public Health

<sup>1</sup>Bachelor Student, Health Care Administration; <sup>2</sup>Supervisor, Dean of the School; <sup>3</sup>Supervisor, MD, JD, PhD, ScD, Professor

### Summary

According to the GLOBOCAN / IARC (2012) data, an estimated 1.1 million men worldwide are diagnosed with prostate cancer annually and 307,000 males die for the same reason. We conducted a descriptive epidemiological study. In 2015-2016, according to Crude Rate 35 per 100,000 men suffered from prostate cancer annually. ASR-27.3. The rate of prostate cancer sharply increases from the age of 55-59 and reaches peak levels in 75-79 age group (299.3‰-301.7‰). Prostate cancer age standardized rate in Tbilisi population was compared with the similar data of European and Asian cities. According to TASR 225 per 100,000 men at the age of 60-79 years were diagnosed with prostate cancer in 2015-2016, in Tbilisi. According to TSRR, the incidence of prostate cancer morbidity in the age group of 60-79 is 2.3 times higher than in the age group of 50-69. According to Relative Frequency, the highest 87.7‰ and 80.9‰ incidence of prostate cancer is recorded in the age groups of 55-79 and 60-79. Detection of I and II stage prostate cancer in PSA screening groups is relatively higher (52.6‰). It was established that amendments in the screening guidelines and monitoring of 60-79 year age group instead of 50-70 years old, will increase the detection of prostate cancer cases by 27.8%. If 50% of target group is involved in the screening program the cost of the program is 289,827, and in case of 70% involvement-it is 405,757.80. Based on the results of the survey, practical recommendations have been developed.

**Abbreviations:** ASR-Age Standardized Rate, TASR-Truncated Age-Standardized Rates, SRR- Standardized Rate Ratio, TSRR- Truncated Standardized Rate Ratio.

**Key words:** Prostate Cancer; PSA Screening, Tbilisi, Management.

### Problems Statement:

According to the GLOBOCAN / IARC (2012) data, about 1.1 million people worldwide were diagnosed with prostate cancer, 70% of these cases was registered in developed countries. The relatively high rate is observed in Australia and North America (97.2 per 100,000 population and age specific frequency 111.6) and in the Western and Northern parts of Europe, as prostate-specific antigen (PSA) testing and subsequent biopsy are quite common in these regions. Incidence rates are relatively high in less developed regions such as South Africa (61.8‰) and South America (60.1‰). But remains low with estimated rate 10.5‰ and 4.5‰ in Eastern and South-Central Asia. With an estimated 307,000 deaths prostate cancer is the fifth leading cause of death from cancer in men (6.6% of total men deaths). Based on the fact that PSA testing has a much greater effect on incidence than on mortality, there is relatively less variation in mortality rates worldwide than is observed for incidence. While prostate cancer deaths are relatively high in less developed countries.

Worldwide, according to data of the year 2012, the highest prostate cancer Age-Standardized Rate 111.6‰ per 100,000 was in Australia and 97.2‰ in North America. While the lowest 4.5‰ was in East and South-Central Asia. As for Europe, France has the highest morbidity rate of 227.2‰, followed by Norway with 129.7‰, Trinidad and Tobago 123.9‰, Barbados 123.1‰, Sweden 119.0‰, Australia 115.2‰, Ireland 114.2‰, Switzerland 107.2‰. The lowest rate was in Central and Eastern Europe- 30‰ in Moldova and 25‰ in Albania. (GLOBOCAN, 2012)

Pakzad, R. et al. (2015) In total there were 191,054 cases of prostate cancer in Asia, the highest incidence rate per 100,000 men was in Israel 84.3‰, 40.6‰ in Turkey, 37.2‰ in Lebanon, 33.1‰ in Singapore and 30.4‰ in Japan. Whereas the lowest was in Uzbekistan 2‰, 1.7‰ in Bangladesh, 2.1‰ in Turkmenistan, 1.2‰ in Bhutan and 1.5‰ in Nepal.

According to the IARC (2003-2007) prostate cancer age standardized morbidity rate for European towns the highest morbidity rate is observed in Italy, Modena (89.3‰) and Germany, Munich (82.5‰). Whereas the lowest is in Naples, Italy (37.5‰).

Ferlay, J. et al. (2013) Prostate cancer mortality rate in 2012 in Europe was 19.3 per 100,000 men. The highest rate is 36‰ in Lithuania, Denmark 34‰, whereas the lowest 14% is in Malta and 13‰ in Albania.

Pakzad, R. et al (2015). Mortality rate in Asia. In 2012 were identified 81,229 cases. According to the standardized data, the highest rate is recorded in Turkey 22.8‰, Lebanon 17.1‰, Armenia 13.1‰, and Philippine 11.3‰. Based on age-standardized rate these countries are included in the list of top five countries where the highest mortality rate is recorded. As for the lowest rate, it is recorded in Bhutan 0.7‰.

According to NCDC (2011-2015) data, in 2011, 169 cases of prostate cancer were reported (incidence rate 7.8‰). In 2012-187, (incidence rate 8.7‰). By the end of 2013, 631 men with diagnosis of malignant prostate cancer were registered in Georgia. With the primary diagnosis-208 (incidence rate-9.5‰) men. In 2014-224 (incidence rate 12.6‰). According to Cancer Register data, 518 new cases of cancer have been reported in 2015. The incidence rate was 29.1‰. If prostate cancer aggregated data for 2014 was 9.4%, in 2015, according to Cancer Register data, it comprised 9.9%. Despite the increased involvement, the register still could not achieved 100% coverage in 2015.

According to GLOBOCAN / IARC (2012) According to statistic database, Georgian age-standardized rate by age groups for 2012 has been adopted, where rate consistently increases and reaches the peak level in age group of 55-50 (147.2‰). Prostate cancer morbidity has not been studied since 2012 in Georgia.

GLOBOCAN/IARC (2012), 278 cases of prostate cancer were reported in all age groups in Georgia. The age-standardized rate per 100,000 men was 7.6.

Wolf, A. M. et al (2010) recommends that men must have decision making option *after* getting information about the uncertainties, *risks, and potential benefits* of prostate cancer screening. They should consider the prostate cancer screening in the following cases:

1. 50-year-old men who are at a moderate risk of prostate cancer and their life expectancy is at least 10 years;
2. 45-year-old men who are at high risk of prostate cancer development. These include Afro-Americans and men whose sons, fathers, brothers have been diagnosed with prostate cancer at an early age i.e. before 65 years;
3. 40-year-old men with relative high risk.

If the screening has not confirmed the presence of prostate cancer, follow-up observation is appointed with consideration of PSA screening.

1. Men who opted for re-examination and have PSA level less than 2.5 ng / ml. should be re-examined only after 2 years.
2. Those who have PSA levels higher than 2.5 ng / ml should be observed annually.

Since the prostate cancer is a slowly progressing disease, asymptomatic men with life expectancy not more than 10 years shouldn't be screened. It is likely that they won't benefit from this.

Mottet, N. et all (2016) According to the Guidelines for the European Association of European Urology (2016), it is thought to be that the men with life expectancy less than 15 years won't benefit from early diagnostics of prostate cancer. For high risk patients follow-up observation should be arranged every two years, and for those who do not belong to the risk group this period should be prolonged up to 8 years.

Since 2011, the National Screening Center provides PSA testing financed by Tbilisi municipality. Which implies assessment of prostate cancer antigen level in 50-70 year old men annually. Initially only the prostate cancer antigen in the blood is determined. If the prostate cancer antigen rate is between 4,0-10,0 ng / ml or more, the free PSA is determined in the same serum, and the ratio is calculated to detect prostate cancer risk and if necessary, the patient is referred to the specialized clinic. The services provided by the program can be used by Georgian citizens registered in Tbilisi Municipality, internally displaced persons, whose place of registration in the database of the LEPL-State Services Development Agency, is Tbilisi. The implementation rule for Disease Screening Subprogram is regulated by Tbilisi Municipality Decree Tbilisi Municipality Resolution №33-92. "Tbilisi Municipality budget sub-health implementation of the rules on approval".

The PSA test coverage rate increases every year since 2011 throughout Tbilisi. In 2016, the coverage rate was the highest compared with the previous years, 5.36% of Tbilisi target population (National Screening Center 2011-2016).

### **Goals and objectives of the study:**

Evaluation of Prostate Cancer Screening Management Characteristics in Tbilisi.

### **Objectives set up considering the design of the study:**

1. Study of Prostate Cancer Morbidity in Tbilisi in 2015-2016;
2. Comparative analysis of prostate cancer morbidity rate between Tbilisi and European countries.
3. Overview of PSA test results in the National Screening Center;
4. Survey of males aged 50-70 years in Tbilisi and evaluation of their satisfaction;

### **Methodology of research:**

Prostate cancer morbidity in Georgia has not been studied

since 2012. With reference to one of the tasks of the Bachelor's Study, prostate cancer morbidity in 2015-2016, has been studied.

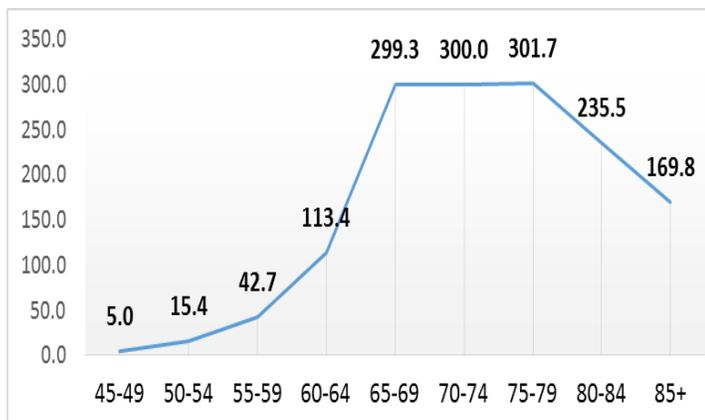
Data from cancer register, regarding morbidity of prostate cancer in Tbilisi in 2015-2016, were obtained, namely: the absolute numbers of new cases according to 5-year age groups, all together 350. We have calculated prostate cancer morbidity Crude Rate, Age-Specific Rate Indicator (AI), Age-Standardized(World) Rate (ASR), Truncated Age-Standardized Rate (TASR) per 100,000 individuals, and Standardized Rate Ratio (SRR), Truncated Age-Standardized Rate Ratio (TSRR) and Relative Frequency Rate in Tbilisi, in 2015. Based on 2015 cancer register, absolute data of prostate cancer morbidity rate by stages has been studied in patients who underwent screening and those who didn't.

Within the scope of the study, economic evaluation of prostate cancer screening in Tbilisi was performed. According to the Tbilisi Municipality Decree "Approval of the Rules for Implementation of Health Care Programs provided by the Tbilisi Municipality Budget", the price of prostate cancer screening, namely *Prostate-specific antigen blood* test, is 9 Gel. By the population census of 2014, the overall number of Tbilisi male population in the 50-69 year age group is 100,173. Based on this data, the cost of the screening program was calculated.

Additional research within the National Screening Program has been undertaken to assess the level of satisfaction with the PSA testing and program awareness in men over the age of 50-70. The research also aimed at assessing the patient's views on the advantages and disadvantages of the program. The number of respondents was determined by the formula of the appropriate sample size calculator and the score for 80% confidence interval was 113.

**Results of the research:**

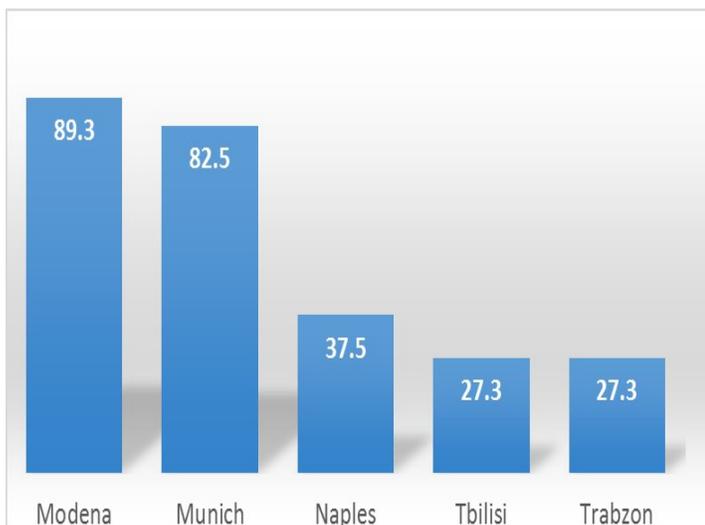
According to the Crude Rate in 2015-2016, in Tbilisi, prostate cancer had an incidence of 35 (35%) per 100,000 males, by Age-Standardized Rate- 27.3. by Age-Specific Rate the incidence of prostate cancer morbidity sharply increases from the age of 55-59 and reaches the peak level in 75-79 age group (299.3‰ -301.7‰ ) annually (See Chart 1).



*Chart 1. Age Specific Rates of Prostate Cancer Incidence 100,000 Male Populations in Tbilisi, 2015-2016*  
 Source: Research results

According to ASR, in 2015-2016, in Tbilisi prostate cancer morbidity incidence was 27(27‰) per 100,000 male annually.

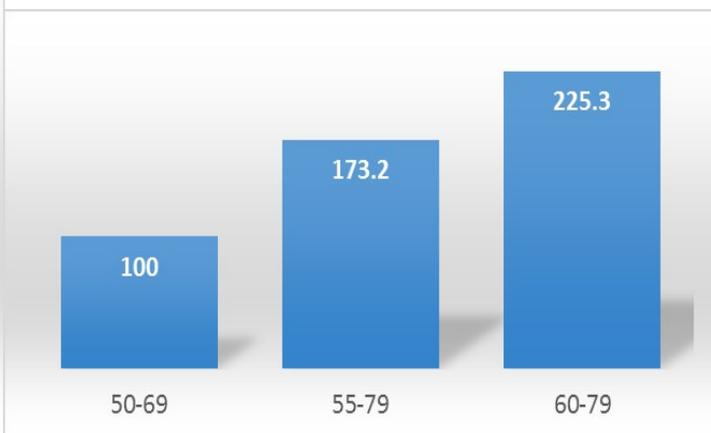
The prostate cancer morbidity Age-Standardized Rate in Tbilisi has been compared to the same indicators of European and Asian cities (where the cancer register is functioning and the frequency rates are reliable) (See Chart 2).



*Chart 2. Age Standardized Rates (ASR) of Prostate Cancer Incidence, in Europe, Asia and in Tbilisi*

Comparative analysis has shown that according to Standardized Rate Ratio, the prostate cancer morbidity level in Tbilisi is 2.4 times lower than the average level of morbidity registered in European cities (65.0). At the same time, prostate cancer morbidity level in Tbilisi is 3.3 times lower than the peak level of morbidity in Europe, which is observed in the Italian city of Modena (89.3) and 3 times lower than in Munich (82.5). In Tbilisi, the prostate cancer morbidity rate was 1.4 times low compared to the lowest level of the same location cancer morbidity in Europe, observed in Italy, Naples (37.5). The incidence frequency similar to Tbilisi was observed in Trabzon (27.3).

The Truncated Age-Standardized Rate (TASR), calculated for different age groups, has been studied. Age groups have been chosen based on age-specific indicators which revealed the increased rate of prostate cancer morbidity by age groups. Thus, the Truncated Age-Standardized Rate was calculated for three age periods. According to the current guidelines, within the scope of a screening program, a standard PSA testing is conducted in the 50-69 age group. Based on Truncated Age-Standardized Rate, in Tbilisi, in 2015-2016, the annual prostate cancer morbidity rate in the 50-69 age group was 100(100‰) per 100,000 male. In the following age periods, where a high Age-Specific Rate was observed, based on Truncated Age-Standardized Rate (TASR<sub>55-79</sub>) was 173‰ and (TASR<sub>60-79</sub>) -225‰.



**Chart 3. - Morbidity of Prostate Cancer in Tbilisi, according to Truncated Age-Standardised Rates by age groups (TASR<sub>50-69</sub>), (TASR<sub>55-79</sub>) and (TASR<sub>60-79</sub>) per 100,000 men. Source: Research results**

To calculate Truncated Age-Standardized Rate Ratio (TSRR) each age group was compared with TASR<sub>50-69</sub>. Prostate cancer morbidity is 1.7 times higher in the 55-79 age group compared to the 50-69 age group. As for the 60-79 age period, it is 2.3 times higher than the prostate cancer morbidity data in the 55-69 age group (See Table 1).

**Table 1. Truncated Age-Standardized Rates and Standardized Rates Ratio of the Prostate Cancer incidence per 100,000 Males in Tbilisi, in 2015-2016**

Age Groups	TASR	TSRR
50-69	100	-
55-79	173.2	1.7
60-79	225.3	2.3

Source: Research results

Based on 2015 cancer register absolute data, prostate cancer morbidity rate by stages has been studied in patients who underwent screening and those who didn't (see Table 2). In 2015, according to cancer register a total of 207 prostate cancer cases were reported. From these cases information about the screening of 89 patients is not available (!).

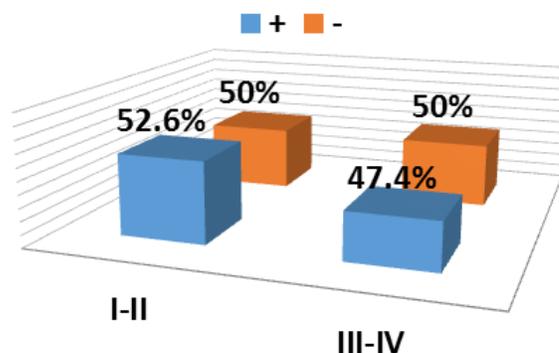
**Table 2. Prostate cancer morbidity stages according to PSA screening test in Tbilisi, in 2015**

Stages	I		II		III		IV	
	Abs	%	Abs	%	Abs	%	Abs	%
Got screening	8	21.1	12	31.6	11	28.9	7	18.5
Didn't got screening	14	17.5	26	32.5	14	17.5	26	32.5

Source: Research results

According to the data of 2015, we can say that in case of screening, detection of the first and second stage prostate cancer cases increases. Since PSA based screening in

52.6% of patients has resulted in an increase of early-stage prostate cancer detection. Whereas, in males with or without screening, the percentage of prostate cancer detection at early or at late stages is equal and amounts 50%.



**Chart 4. - Distribution of Prostate Cancer morbidity stage rates based on PSA screening in Tbilisi, in 2015 Source: Research Results**

Unfortunately, in 2016 in contrast with 2015, in the Cancer Registry database, no data about the participation of patients in the screening program is registered at all. Consequently, the role of screening in the detection of prostate cancer at an early stages can not be measured in dynamics. Blank columns and inaccurate data indicate to the inaccurate management of the cancer register. Revision the quality of data entry in the databases and correction of this databases is not likely. Additionally, this is evidenced by the data on clinical stages of prostate cancer.

According to the 2016 Cancer Registry data a total of 143 cases of prostate cancer have been reported. Of these, in 30 cases clinical stage is either unknown or data is unavailable. Compared to the Cancer Registry of the year 2013, the number of blank columns is reduced, although the flaws still appear. Based on the results obtained, in 2016 compared with 2015 the early stage (I-II) prostate cancer morbidity detection has decreased from 50.8% to 38.1%, while the identification of III-IV stage cancers have increased from 49.2% to 61.9%.

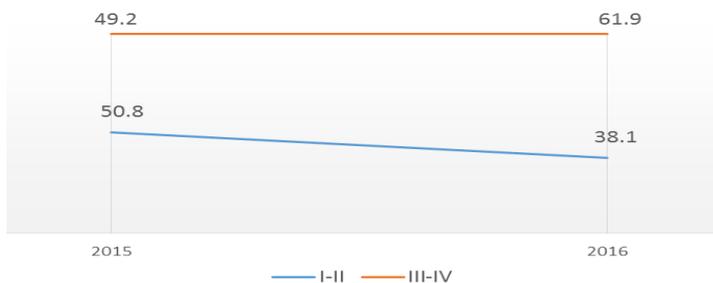


Chart 5. Rate of prostate cancer stages in dynamics in 2015-2016

Within the scope of the study the economic evaluation for prostate cancer screening in Tbilisi was conducted. According to the Tbilisi Municipality Decree "Approval of the Rules for Implementation of Health Care Programs provided by the Tbilisi Municipality Budget", the price of prostate cancer screening, namely Prostate specific antigen blood test, is 9 Gel. By the 2014 population census, total number of male population in Tbilisi in the 50-69 age group amounted to 100,173. Based on this data, the cost of the screening program was calculated.

Based on the European and US Prostate Cancer Screening Guidelines, since the prostate cancer is a slowly progressing disease, men with life expectancy not more than 10 years shouldn't be screened. It is likely that they won't benefit from this.

Taking into consideration the morbidity rate calculated within the scope of this recommendation and research the following age groups (50-69, 55-79 and 60-79) were selected. During calculation, 50% of target population and 70% of screening cases were discussed (See Chart 6).

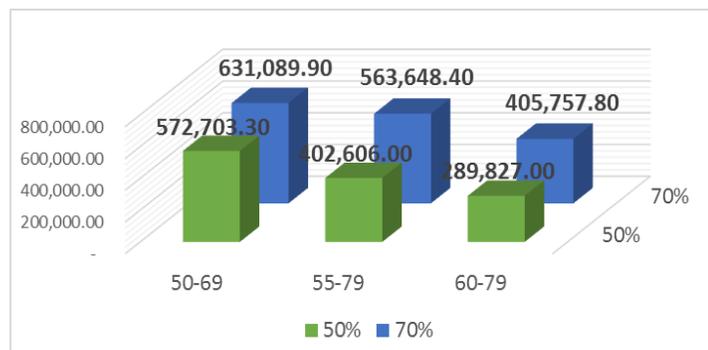


Chart 6. Cost of prostate cancer screening in 50-69, 55-79 and 60-79 age groups in case of 50% and 70% coverage of the target groups

Source: Research results

In case of 50% coverage of the 50-69 age group the screening cost will be 572,703.30 GEL, while 70% coverage amounts to 631,089.90 GEL. 50% coverage of the 55-79 age group the screening cost will be 402,606 GEL, while 70% coverage of the same group amounts to 563,648 GEL. Relatively cost-effective have proven to be the PSA testing of the 60-79 year age group, in case of 50% coverage, the cost of the test will be 289,827 GEL, while 70% coverage will cost 405,757.80 GEL.

The cost of prostate cancer screening according to the relevant age groups and coverage percentage obtained from economic analysis was compared with the 50-69 age group screening (See Table 3).

Table 3. PSA screening cost Ratios in case of 50% and 70% coverage of the target groups

Age Groups	Cost (GEL)		PSA Screening Cost Ratios	
	50%	70%	50%	70%
50-69	572,703.30	631,089.90	-	-
55-79	402,606.00	563,648.40	170,097.30	67,441.50
60-79	289,827.00	405,757.80	282,876.30	225,332.10

Source: Research results

Depending on the results, we can say that if the age period shifts and includes men aged 50-69 rather than 55-79 years old, the cost of screening program will reduce, in case of 50% coverage by 170,097.30 GEL and in the case of 70% coverage by 67,441.50 GEL. In the second discussed case, coverage of 60-79 year age group instead of 50-69 aged males, the screening program will be more cost-effective and allow us to save 282,876.30 GEL and 225,332.10 GEL, in the case of 50% and 70% coverage, respectively.

Within the scope of National Screening Program additional research has been conducted among 50-70 year old male to evaluate their satisfaction with PSA testing and the program awareness level. The research also aimed at assessing the patient's views on the virtues and shortcomings of the program. The number of respondents has been defined for a confidence interval of 80%, amounting to 113. The sample size has been selected based on the appropriate formula, used by the program on the site [Openepi.com](http://Openepi.com). The questionnaire included 10 questions.

13 (12%) out of 113 respondents were in 50-54 age group, 23 (20%) – in 55-59 age group, 33 (29%) in 60-64 age group, and most respondents were between 65 and 70 years old, in particular 44 (39%).

To the question when and how the men who applied to the hospital got the information about the screening program, the highest rate had information released by friends 41 (36%) and television 33 (29%), followed by the information obtained from the doctor 25 (22%), Internet 5 (4%) and Brochure 1 (1%).

To the question whether the patient would return to the survey, thus, estimating the satisfaction with the services provided, the results were the following: those interested in coming for free survey repeatedly, a year later, were 105 (93%) and the number of negative responses was 8 (7%).

To the question if the information given in the advertisement brochure was comprehensive, from the three possible answers, on average, equal percentage 57(50%) and 56 (50%) had two - "yes" and "I do not know". To the question whether the patient had to wait long for the service, negative answer had 102 (90%) respondents, while positively responded 11(10%). Based on the fact that the National Screening Center from the 1<sup>st</sup> of March did not serve the patients with legal regional addresses, and the satisfaction survey was underway just in this period, consequently

the drop in the patient flow occurred and it is likely that these changes minimized the queues, hence the number of satisfied patients increased.

111 patients (98%) of the screening program said that they would recommend others the PSA screening and 2 (2%) had negative feedback.

100 (88%) respondents think that the period between the research and receiving the research results is not long, and on the contrary 12 (12%) think that it is.

National Screening Center provides the patients with the research results only after submission of the identity document. As for the respondents' answer, to the question whether this form of receiving results is acceptable for them 103 (93%) answered positively. For 3 (3%) this form is not acceptable and the rest 7 (6%) wants to receive answers in another form. For example, on the basis of a phone call, without visiting the Center.

To the question if the respondents were satisfied with the services received in the screening center, 100% of respondents responded positively. When the patient is satisfied with the medical service he / she maintains a relationship with the clinic and recommends it to his relatives and friends.

As of the last 10<sup>th</sup> open question –“How the service can be improved, what will you change?” responders replied the following, they want the doctor Urologist’s consultation to be included in free study, and also to increase the age limit, as now the free screening program covers only males aged 50 to 70 years old. Additionally they also want to get the results of the research in electronic form, by phone call or e-mail. The desire to regulate queues in electronic format has been elicited in the National Screening Center. In their answers the respondents also expressed their desire to visit the screening office according to the place of residence, they wanted more advertisements on television and radio, and also more information before

analysis, namely, how to prepare for research, or whether it is allowed to take food before the analysis. One patient reported that he tried to find this information on the internet but in vain. There was also an opinion that a free PSA testing should be accompanied by an ultrasound study within the program. Open question revealed the appreciation and satisfaction.

**Conclusions:**

1. According to the Crude Rate in 2015-2016, in Tbilisi, prostate cancer had an incidence of 35 (35‰) per 100,000 males, by Age-Standardized Rate-27.3‰, by Age-Specific Rate the incidence of prostate cancer morbidity sharply increases from the age of 55-59 and reaches the peak level in 75-79 age group (299.3‰ - 301.7‰) annually.
2. It has been established that according to SRR, the level of prostate cancer in Tbilisi is 2.4 times lower than the average level of incidence registered in European cities (65.0). At the same time, prostate cancer incidence in Tbilisi is 3.3 times lower compared to the peak level of incidence rate in Europe, which is observed in the Italian city of Modena (89.3) and 3 times lower than in Munich (82.5). In Tbilisi, the prostate cancer incidence rate was 1.4 times lower compared to the lowest level of cancer in Europe, namely the Italian city of Naples (37.5). A similar incidence rate as in Tbilisi was observed in Trabzon (27.3).
3. According to Truncated Age-Standardized Rate in Tbilisi, in 2015-2016, annual prostate cancer morbidity rate in the 50-69 age group was 100 (100‰) per 100,000 male, in the age group 55-79 -173‰, and 225‰-in the 60-79 age group.
4. In accordance with the TSRR, Prostate cancer incidence is 1.7 times higher in the 55-79 age group compared to the 50-69 age group, whereas in 60-79 age group it is 2.3 times higher. According to the relative frequency rate 53.1% of prostate cancer cases are detected in the 50-69 age group, 87.7% - in 55-79 age group and 80.9%- in 60-79 age group.
5. Detection of prostate cancer cases at early, (I-II) clinical stages is higher (52.6%) in male population who underwent the PSA screening.
6. In case of 50% coverage of Tbilisi 50-69 age group male population the screening cost will be 572,703.30 GEL, while 70% coverage will amount to 631,089.90

GEL. In the event of 50% coverage of the 55-79 age group the screening cost is 402,606 GEL, while 70% coverage of the same group will amount to-563,648 GEL. In case of 50% coverage 60-79 year age group, the cost of the test will be 289,827 GEL, while 70% coverage will cost 405,757.80 GEL.

7. The most cost effective age group for PSA screening was established: 60-79 years, with incidence of more than 27.8% prostate cancer cases, and in the event of 50% and 70% screening coverage of this group saving of 282,876.30 GEL and 225,332.10 GEL, respectively, will be achieved, and compared to similar coverage volume of 50-69 age group.
8. The level of satisfaction and program awareness according to the survey results are the following:all (100%) of the 113 males interviewed at the National Screening Center are satisfied with the services received in the Screening Center; 41 (36%) and 33 (29%) received the information about the screening program from friends and television, respectively. 105 (93%) expressed willingness to come for free research repeatedly, i.e. after a year,; 102 (90%) respondents think that they did not have to wait long for the service;111 (98%) men suggested that they would recommend others participation in PSA screening, 100 (88%) believes that the period before receiving the answers from the research is not long; for 103 (93%) the current form of receiving the study results is acceptable ; In order to improve the service, the respondents consider the following measures: increase screening age limit, introduce doctor urologist's consultation and ultrasound in the guideline, receive research results in electronic form(by phone call or e-mail), more access to information about the research before screening.

**Recommendations:**

1. In order to increase the cost-efficiency of the prostate cancer screening program it is recommended to make changes in the program guidelines, namely: to conduct PSA screening in the 60-79 age group instead of 50-70 (which allows us to detect more than 27.8% of prostate cancer cases); Subsequent PSA testing in asymptomatic men once in two years (which will reduce the screening expenses twice).

2. In order to increase the assessment efficacy and screening program monitoring quality, it is recommended, the Population Register for Cancer improve the quality of electronic database, register clinical stages of the cancer and cases of patients' participation in the screening program.
3. In order to increase the screening program efficacy, it is recommended, the National Screening Center increase the PSA screening coverage of target group, by providing the information about the screening with the help of television.
4. In order to improve the quality of screening services, it is recommended, The National Screening Center introduce a queue management system for patients, deliver the results of the conducted research in electronic form (at patients option), provide programmed Call-Recall System of patients.
5. Ferlay J., Steliarova-Foucher E., Lortet-Tieulent J., et al. (2013). Cancer incidence and mortality patterns in Europe: Estimates for 40 countries in 2012. *European Journal of Cancer* (2013), page. 1374-1403.
6. Mottet, N., Bellmunt, J., Briers, E., Bolla, M., & Cornford, P. et al. Guidelines on Prostate Cancer. Accessed May 1, 2017, From <https://uroweb.org/wp-content/uploads/EAU-Guidelines-Prostate-Cancer-2016.pdf>
7. Pakzad, R., Mohammadian-Hafshejani, A., Ghoncheh, M., Pakzad, I., & Salehiniya, H. (2015). The incidence and mortality of prostate cancer and its relationship with development in Asia. *Prostate International*, 3(4), 135-140. DOI:10.1016/j.pnil.2015.09.00 <http://www.sciencedirect.com/science/article/pii/S2287888215300738>

**Reference:**

1. National Center for Disease Control and Public Health, (2011) – Statistical Yearbook 2011. -Tbilisi. Accessed May 1, 2017, From [http://www.ncdc.ge/AttachedFiles/2011%201\\_31628035-eeeb-4f80-a791-e4dc60d1a4c8.pdf](http://www.ncdc.ge/AttachedFiles/2011%201_31628035-eeeb-4f80-a791-e4dc60d1a4c8.pdf)
2. National Center for Disease Control and Public Health, (2016)-Cancer incidence in Georgia.-Tbilisi. Accessed May 1, 2017, From [http://www.ncdc.ge/AttachedFiles/Cancer\\_Analisys\\_FINAL\\_83655e88-d8a4-48bc-ae24-1890a0c3785a.pdf](http://www.ncdc.ge/AttachedFiles/Cancer_Analisys_FINAL_83655e88-d8a4-48bc-ae24-1890a0c3785a.pdf) Retrieved in May 1, 2017
3. Bray, F., Ferlay, J., Laversanne, M., Brewster, D., Mbalawa, C. G., Kohler, B., Forman, D. (2015). Cancer Incidence in Five Continents: Inclusion criteria, highlights from Volume X and the global status of cancer registration. *International Journal of Cancer*, 137 (9), page. 2060-2071. DOI:10.1002/ijc.29670
4. Ferlay J, Soerjomataram I, Ervik M, et al. GLOBOCAN 2012 v1.0, Cancer Incidence and Mortality Worldwide: IARC CancerBase No. 11 [Internet]. Lyon, France: International Agency for Research on Cancer; 2013. Accessed May 1, 2017, From [https://www.iarc.fr/en/media-centre/iarcnews/pdf/Ferlay%20J\\_EJC\\_2013.pdf](https://www.iarc.fr/en/media-centre/iarcnews/pdf/Ferlay%20J_EJC_2013.pdf)
8. Wolf, A. M., Wender, R. C., Etzioni, R. B., Thompson, I. M., D'Amico, A. V., Volk, R. J., Smith, R. A. (2010, 03 მარტი). American Cancer Society Guideline for the Early Detection of Prostate Cancer. Accessed May 1, 2017, From <http://onlinelibrary.wiley.com/doi/10.3322/caac.20066/full>
9. Tbilisi Municipality Resolution №33-92. “Tbilisi Municipality budget sub-health implementation of the rules on approval”. Date Received 27/12/2016, Publication Date 30/12/2016.