RESEARCH ARTICLE

Editorial Process: Submission:04/17/2023 Acceptance:07/08/2023

Screening for Breast, Cervical and Prostate Cancers in Kazakhstan: Key Factors and Psychological Aspects

Alfiya Shamsutdinova[1,2], Botagoz Turdaliyeva[3], Shynar Tanabayeva[2], Aida Omarova[4], Timur Saliev[2], Baimakhan Tanabayev[5], Ildar Fakhradiyev[2]*

Abstract

Objective: Screening is the main method for early detection and reduction of cancer mortality in all countries, including Central Asia and Kazakhstan. However, there is no official data on the awareness of the population about cancer screening in Kazakhstan. In addition, there were no studies on the psycho-emotional state of the patients during the screening procedure conducted yet. The purpose of the study was to assess the potential factors of awareness and psycho-emotional state during screening for breast (BC), cervical (CC), and prostate cancers (PC) in Kazakhstan (using the example of Almaty city). **Methods:** This cross-sectional study was conducted in the period from 01/01/2017 to 05/31/2017. The study was carried out at six polyclinics in Almaty (Kazakhstan). 1 625 volunteers took part in the study. The special questionnaires were employed to assess awareness of the screening procedure and subjective feelings during screening. The survey was conducted on patients who were screened for BC (n=674 or 41.5%), CC (n=565 or 34.8%) and PC (n=386 or 23.8%). Demographic data (age, education, marital status, preferred language of communication, etc.) were collected from participants using in-depth interviews. The internal consistency of the questionnaires was analysed by determining the reliability index (Cronbach's alpha). **Results:** The mean age of screening participants was 54.6 ± 3.3 years (BC), 49.2 ± 7.3 years (CC), and 56.6 ± 5.1 years (PC) (p = 0.001). Participants in BC and CC screening had a general knowledge of the procedure (45.1 % and 59.8 % of cases, respectively). Men had no information about PC screening (76.4 % of cases, p = 0.001). On the other hand, women had no sufficient knowledge about mammography (46.4 %) and Papanicolaou (Pap) test (51.2% of cases). In 40.1 % (BC) and 41.1 % (CC) of cases, the fact of having the test was an unpleasant circumstance. However, in 59.6 % (PC) of cases, men did not have any discomfort associated with undertaking the test (p = 0.001). PC screening participants experienced no discomfort in 58.3 % of cases. At the same time, participants in BC and CC screenings experienced discomfort in 38.1 % and 42.5 % of cases, respectively (p = 0.001). Analysis of internal consistency on the questionnaire on awareness of the screening procedure showed the value of Cronbach's Alpha 0.693. The scores of subjective feelings during screening were 0.702. **Conclusions:** The study's results revealed the reliability and applicability of the questionnaires on awareness of the screening procedure and assessment of subjective feelings. Knowledge of general information about the screening program differed depending on the type of screening. Participants in BC and CC screening were more likely to be aware of the screening program than participants in PC screening. An unpleasant circumstance associated with screening test is most often considered the very fact of having the test, especially for participants in BC and CC screening. The results of this study highlight the importance of providing an information campaign to raise awareness about screening tests. In addition, the results indicate the need to provide patients with full information about the screening process, and possible risks and benefits.

Keywords: Attendance- cancer screening- knowledge- adherence- breast cancer- cervical cancer- prostate cancer

Asian Pac J Cancer Prev, **24 (7)**, 2515-2522

Introduction

Breast cancer (BC), cervical cancer (CC), and prostate cancer (PC) are serious public health problems in many countries, including Kazakhstan (Pak et al., 2021, Shertaeva et al., 2023, Gassanov et al., 2020). Cancer ranks as the first or second leading cause of premature death (deaths occurring between the ages of 30-69) in 134 countries, according to statistics. Moreover, the disease burden is expected to increase over time in low- and middle-income countries (Cao et al., 2020). The cancer outcomes depend on early detection at the first stage and treatment is started as soon as possible (Smith and Oeffinger, 2020).

*[1]JSC «Central Clinical Hospital», Almaty, Republic of Kazakhstan. [2]S.D. Asfendiyarov Kazakh National Medical University, Almaty, Republic of Kazakhstan. [3]Kazakhstan Medical University "Kazakhstan School of Public Health", Almaty, Republic of Kazakhstan. [4]Astana Medical University, Astana, Republic of Kazakhstan. [5]South- Kazakhstan Medical Academy, Shymkent, Republic of Kazakhstan. *For Correspondence: fakhradiyev.i@kaznmu.kz*

Screening is the primary tool for early detection and reduction of cancer mortality (Hall et al., 2018). In fact, there are many types of cancers for which early detection tests have proven to be effective in increasing survival rates (Soejomataram and Bray, 2020). Currently, the most important strategy for reducing mortality from BC, CC and PC is regular screening based on diagnostic procedures such as mammography and Papanicolaou test (Pap test), determination of prostate-specific antigen (PSA), etc. (Damiani et al., 2015, Catalona, 2018).

Despite recent progress in treatment and cancer diagnostics, malignant neoplasms remain the second leading cause of death in both men and women (Price et al., 2020). Barriers to cancer screening are associated with socioeconomic and psychological factors, or poor accessibility (Toleutayeva et al., 2022).

Organized screening programs are based on specific defining elements: a well-defined target population, the introduction of a population database, the existence of quality control procedures, screening tests, and epidemiological monitoring of the effectiveness of the program itself (Williams et al., 2014). In many developed countries, insufficient screening tests are associated with financial and material issues, including an insurance policy (Hall et al., 2018, Price et al., 2020). It should be noted that despite the availability of free-of-charge screening examinations in Kazakhstan (since 2008), there is a growth of new cases of malignant neoplasms.

At present, there is low adherence to screening programs in Kazakhstan. This highlights the need for the country's healthcare system to educate the population more effectively on the importance of preventive cancer screening (Wardle et al., 2015). The purpose of the study was to assess the potential determinants of awareness and psycho-emotional state during screening for breast (BC), cervical (CC), and prostate cancers (PC) in the one of the largest city of Kazakhstan by using the developed new questionnaires of general knowledge and subjective feelings about screening. In addition, the study aimed to evaluate of reliability of these questionnaires during the study.

Materials and Methods

Study design

This cross-sectional study was conducted in the period from January to May 2017. The study was carried out at six city polyclinics (No. 1, 9, 11, 13, 18, 25) of Almaty, located in different parts of the metropolis, both in the centre and on the outskirts. The study involved those polyclinics whose management agreed to conduct the study.

Data collection and participants

The study included the questionnaires for women who had been screened for BC and CC (who underwent a mammogram test and/or had a Pap test), and for men who had been screened for PC (i.e. passed the prostate-specific antigen (PSA) testing). Thus, all women and men of the target groups had an equal chance of being included in the sample. The questionnaire was voluntary and anonymous, and it was conducted after obtaining informed consent.

From the target age groups for screening for BC and CC 1 015 women were surveyed in Almaty, Kazakhstan. Overall, 239 questionnaires were received (674 for breast cancer screening and 565 for cervical cancer screening), 224 women participated in two programs. 386 men participated in screening for PC.

Inclusion criteria

Inclusion criteria for BS screening: women screened at ages 50, 52, 54, 56, 58, and 60.

Inclusion criteria for CC screening: women screened at ages 30, 35, 40, 45, 50, 55, and 60.

Inclusion criteria for PC screening: men screened at ages 50, 54, 58, 62, and 66.

Exclusion criteria

Absence of informed consent to participate in the survey.

Questionnaires

The assessment of awareness about screening of participants in screenings for BC/CC/PC was carried out using the developed two questionnaires. Questions on the screening general knowledge (questionnaire) are presented in Table 1. The questions on the questionnaire on subjective feelings about screening are shown in Table 2.

To determine internal consistency, Cronbach's alpha coefficient was calculated for the questionnaires. Values above 0.6 were considered satisfactory. In our study, a Cronbach alpha value below 0.5 was considered unacceptable.

Questionnaires were completed in Russian or Kazakh languages at the request of the study participant in order to identify the preferred language for receiving information about screening. Socio-demographic data (age, education, marital status, preferred language of communication, number of screenings) were collected from screening participants using in-depth interviews. The first questionnaire (general knowledge about screening) consisted of questions such as knowledge of the pre-test screening program, knowledge of mammography/Pap test/PS prior to the test, sources of knowledge about screening, improved knowledge of screening after the test, need for more information about screening, as well as preferred sources of information.

The second questionnaire on subjective feelings (after having the screening test) assessed the following emotions/feelings: feelings (sensations) while waiting for the screening test, feelings (sensations) during the screening test, unpleasant feelings during the test, the feelings that appeared when receiving the test results, feelings (expectations) of test results, and willingness to recommend screening to relatives / friends. The effect of potential factors, including clinical and demographic indicators (age, gender, education, marital status, frequency of participation in screening, etc.) were studied.

By age, study participants were divided into 4 age categories: 30-39 years old, 40-49 years old, 50-59 years old, and 60-69 years old.

Statistical analysis

All statistical calculations were performed using SPSS software (version 25.0, IBM SPSS Inc., Chicago, USA). A p-value < 0.05 was considered statistically significant. All data were summarized using descriptive statistics methods. To assess the difference between independent samples, the nonparametric Kruskal-Wallis H test was used. Analysis of the internal consistency of the questionnaires was carried out by determining the reliability index (Cronbach's alpha coefficient).

Results

Socio-demographic and clinical factors (potential determinants) are presented in Table 3. N = 674 (41.5 %) and n = 565 (34.8 %) women participated in the survey for screening for BC and CC, respectively. Whereas n = 386 (23.8 %) men were screened for PC (Figure 1).

The average age of survey participants who were screened for BC and CC was 54.61 ± 3.378 years and 49.29 ± 7.350 years. The age of survey participants who were screened for prostate cancer was 56.65 ± 5.118 years, respectively (p = 0.001). For BC, in the vast majority of n = 581 (86.2 %) cases, survey participants were in the age group of 50-59 years. In addition, participants screened for CC and PC in n = 244 (43.2 %) and n = 284 (73.6 %) cases were also in the 50-59 age group. Therefore, age was identified as a potential determinant influencing screening rate.

According to the results acquired, the marital status of the survey participants after screening in all BC/CC/PC was a statistically significant potential determinant, due to the prevalence (more than 60 %) among the screening participants of married people (p = 0.04). The preferred language of communication, as well as the frequency of screening participation (BC/CC/PC tests) were assessed by potential determinants (p = 0.001). The number of BC screening participants was almost identical for the first time and for the second time (n=310-313 or 46-46.4 %). At the same time, the amount of CC screening patients for the first time prevailed (n=441 or 78.1 %). The male participants in all n=386 (100 %) cases were screened for PC for the first time.

The levels of education (p = 0.927) and the method of invitation to screening (p = 0.58) were not identified as statistically significant potential determinants that can affect the participation in screening for BC/CC/PC. The analysis of internal consistency for the questionnaire on awareness of the screening procedure yielded a Cronbach's Alpha value of 0.693, while the questionnaire on subjective feelings during screening had a value of 0.702. The results of the screening general knowledge questionnaire consisted of questions such as knowledge about the screening program for BC/CC/PC are presented in Table 1.

The BC and CC screening participants noted the possession of general information before screening, in n = 304 (45.1 %) and n = 338 (59.8 %) cases. At the same time, men who underwent PC screening knew nothing about this type of screening =295 (76.4 %) of (p=0.001).

Regarding knowledge about mammography/Pap test/PSA before having the test, in n=313 (46.4%) women nobody knew about mammography. A slightly more than half of n=289 (51.2%) women participating in CC screening got a general information about the test. Additionally, the prevailing part of n=304 (78.8 %) men did not know anything about PC test, which was regarded as a statistically significant difference (p = 0.001).

Data for all three types of screening demonstrate that, in comparison with other sources, obtaining information from health workers in more than 42.0% of cases was effective and statistically significant (p = 0.001). In terms of post-test screening data, participants in n=313 (46.4 %) and n=216 (56.0 %) BC and PC screening learnt almost nothing new. However, n=289 (51.2 %) women who were screened for CC noted an improvement in their knowledge of screening (with a statistically significant difference, p = 0.001).

According to the respondents' answers, in terms of improvement in knowledge on screening after BC and CC tests, there was a slight improvement in knowledge, in n=332 (49.3 %) and n = 277 (49.0 %) cases. It was relatively lower than in the group of PC test participants (n=207 or 53.6 %), p = 0.001. Among CC and PC screening participants, the need for additional information about screening was confirmed in n = 388 (68.7%) and n

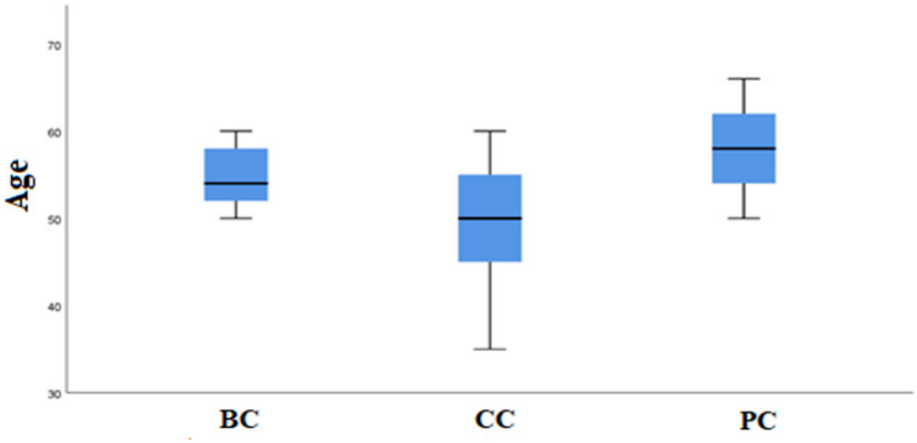

Figure 1. Age Indicators of Survey Participants on Screening for BC/CC/PC

Table 1. Questionnaire Results on General Knowledge on Screening for BC/CC/PC.

Questions	BC n (%)	CC n (%)	PC n (%)	p
Knowledge of the pre-test screening program				0.001*
Almost nothing	228 (33.8)	176 (31.2)	295 (76.4)	
General information	304 (45.1)	338 (59.8)	78 (20.2)	
Almost everything	142 (21.1)	51 (9.0)	13 (3.4)	
Mammogram/Pap/PSA knowledge prior to taking the test				0.001*
Almost nothing	313 (46.4)	174 (30.8)	304 (78.8)	
General information	199 (29.5)	289 (51.2)	66 (17.1)	
Almost everything	162 (24.0)	102 (18.1)	16 (4.1)	
Sources of knowledge about screening				0.13
Medical workers	284 (42.1)	249 (44.1)	162 (42.0)	
Friends/relatives/spouse	59 (8.8)	35 (6.2)	33 (8.5)	
Internet	63 (9.3)	73 (12.9)	25 (6.5)	
Brochures	74 (11.0)	29 (5.1)	0	
Did not receive	194 (28.8)	179 (31.7)	166 (43.0)	
Knowledge about post-test screening				0.001*
Almost nothing	313 (46.4)	174 (30.8)	216 (56.0)	
General information	199 (29.5)	289 (51.2)	126 (32.6)	
Almost everything	162 (24.0)	102 (18.1)	44 (11.4)	
Improving knowledge of post-test screening				0.001*
On the same level	217 (32.2)	136 (24.1)	131 (33.9)	
Improved slightly	332 (49.3)	277 (49.0)	207 (53.6)	
Improved significantly	125 (18.5)	152 (26.9)	48 (12.4)	
Need for more information about screening				0.001*
Yes	344 (51.0)	388 (68.7)	234 (60.6)	
No	295 (43.8)	136 (24.1)	107 (27.7)	
Difficult to answer	35 (5.2)	41 (7.3)	45 (11.7)	
Preferred sources of information				0.12
Health workers	205 (30.4)	211 (37.3)	147 (38.1)	
Friends/relatives/spouse	51 (7.6)	36 (6.4)	27 (7.0)	
Internet	104 (15.4)	113 (20.0)	78 (20.2)	
Brochures	94 (13.9)	44 (7.8)	22 (5.7)	
Videos in public places	70 (10.4)	46 (8.1)	16 (4.1)	
Other	150 (22.3)	115 (20.4)	96 (24.9)	
Cronbach's alpha	0.687	0.721	0.654	
Cronbach's alpha	0.693			

= 234 (60.6 %). This number was higher compared to the group of BC participants (n = 344 or 51.0 %), p = 0.001.

The results of the questionnaire survey on subjective feelings (while waiting for screening) are presented in Table 2. The results indicate that after having the screening for BC and PC in n=315 (46.7 %) and n=162 (42.0 %) cases, the respondents had anxiety during the waiting time. Nevertheless, CC screening participants noted the absence of any feelings in n = 231 (40.9 %) (p = 0.001). Regarding the sensations of feelings during the screening test, the participants in the PC screening group in n = 225 (58.3 %) cases did not report the presence of any feelings. At the same time, the BC and CC tests respondents noted the presence of a feeling of discomfort in n = 257 (38.1 %) and n = 240 (42.5 %) cases (p = 0.001).

The question of a particularly unpleasant circumstance during the test, participants who were screened for BC and CC in n = 270 (40.1 %) and n=232 (41.1 %) cases, the mere fact of having the test was considered unpleasant. At the same time, the majority of PC screening participants noted the absence of any unpleasant circumstances associated with the test n=230 (59.6 %), p = 0.001. According to the results of the survey on the tests methods and timing, respondents in the three types of screening received no information in more than half of the cases (p = 0.001). The respondents in BC and CC tests reported on the anxiety in n=414 (61.4 %) and n=332 (58.8%) cases, respectively. It was higher than these indicators in n=152 (39.4 %) respondents who were screened for PC (p = 0.001).

Regarding the desire to recommend screening to the

Table 2. The Results of the Questionnaire on Subjective Feelings while Waiting for Screening for BC/CC/PC.

Questions	BC n (%)	CC n (%)	PC n (%)	p
Feelings/feelings while waiting for a screening test				0.001*
None	175 (26.0)	231 (40.9)	133 (34.5)	
Anxiety	315 (46.7)	205 (36.3)	162 (42.0)	
Fear	164 (24.3)	116 (20.5)	77 (19.9)	
Difficult to answer	20 (3.0)	13 (2.3)	14 (3.6)	
Feelings/feelings during the screening test				0.001*
None	176 (26.1)	142 (25.1)	225 (58.3)	
Discomfort	257 (38.1)	240 (42.5)	69 (17.9)	
Soreness	61 (9.1)	68 (12.0)	42 (10.9)	
Nervousness, shame	163 (24.2)	96 (17.0)	45 (11.7)	
Difficult to answer	17 (2.5)	19 (3.4)	5 (1.3)	
What was especially unpleasant during the test?				0.001*
Nothing	176 (26.1)	142 (25.1)	240 (62.2)	
Unprepared for the test	192 (28.5)	131 (23.2)	58 (15.0)	
The test itself	270 (40.1)	232 (41.1)	36 (9.3)	
Presence of strangers	19 (2.8)	41 (7.3)	45 (11.7)	
Difficult to answer	17 (2.5)	19 (3.4)	7 (1.8)	
What were you told about the test results: when and how you will get it				0.001*
Nothing	447 (66.3)	292 (51.7)	230 (59.6)	
Need to find out for yourself	173 (25.7)	229 (40.5)	107 (27.7)	
I will be informed	54 (8.0)	44 (7.8)	49 (12.7)	
Feelings/expectations of the test result				0.001*
None	107 (15.9)	139 (24.6)	138 (35.8)	
Anxiety	414 (61.4)	332 (58.8)	152 (39.4)	
Fear	91 (13.5)	71 (12.6)	75 (19.4)	
Difficult to answer	62 (9.2)	23 (4.1)	21 (5.5)	
Would recommend screening to your relatives/friends				0.001*
Yes	554 (82.2)	407 (72.0)	98 (25.4)	
No	64 (9.5)	126 (22.3)	186 (48.2)	
Difficult to answer	56 (8.3)	32 (5.7)	102 (26.4)	
Cronbach's alpha	0.35	0.077	0.533	
Cronbach's alpha	0.702			

relatives/friends, participants who were screened for BC and CC in n = 554 (82.2 %) and n = 407 (72.0 %) cases reported on the presence of such a desire. However, the vast majority of the PC test participants were unwilling to recommend this type of the screening, n = 186 (48.2 %), (p = 0.001).

Discussion

The cancer screening is a form of secondary prevention, that is, "the use of various tests on apparently healthy people to identify those who are likely to have risk factors or are in the early stages of certain diseases" (Smith and Oeffinger, 2020). It indicates the importance of increasing commitment to and promotion of screenings. Screening is critical to achieving the goals of organized health programs. Moreover, it has been also considered one of the indicators of the quality of care(Chung et al., 2008). This study was aimed at assessing the potential determinants of awareness and participation in screening for BC/CC/PC using the example of the largest city of Kazakhstan in 2017, and also reliability of questionnaires regarding general knowledge and subjective feelings about screening were evaluated.

The analysis identified several potential determinants influencing screening for BC, CC, and PC. The age of the survey participants, within the range of 50-59 years in comparison with other age categories, was determined to be a statistically significant determinant influencing screening (p=0.001). In our study, marital status, namely being married/unmarried, was also identified as a potential determinant influencing screening rate (p=0.001).

Such a result conforms with data of the previous study. It was found out that married women are more likely to undergo regular screening for cervical cancer compared to unmarried or single women (Zhang et al., 2022). For

Table 3. Demographic and Clinical Characteristics of Survey Participants by Screening for BC/CC/PC

Potential determinants	Screening type			p
	BC n-674	CC n-565	PC n-386	
Age mean + SD	54.61±3.378	49.29±7.350	56.65±5.118	0.001*
30-39	-	32 (5.6)	-	
40-49	-	196 (34.7)	-	
50-59	581 (86.2)	244 (43.2)	284 (73.6)	
60-69	93 (13.8)	93 (16.5)	102 (26.4)	
Education				0.927
Average	54 (8.0)	35 (6.2)	13 (3.4)	
Specialized secondary	209 (31.0)	203 (35.9)	164 (42.5)	
Incomplete higher education	229 (34.0)	151 (26.7)	87 (22.5)	
Higher	182 (27.0)	176 (31.2)	122 (31.6)	
Family status				0.04*
Married	420 (62.3)	389 (68.8)	272 (70.5)	
Not married	52 (7.7)	46 (8.1)	23 (6.0)	
Divorced	155 (23.0)	107 (18.9)	76 (19.7)	
Widow	47 (7.0)	23 (4.1)	15 (3.9)	
Preferred language of communication				0.001*
Kazakh	356 (52.8)	225 (39.8)	187 (48.4)	
Russian	318 (47.2)	340 (60.2)	199 (51.6)	
Participation in screening				0.001*
1st time	310 (46.0)	441 (78.1)	386 (100)	
2nd time	313 (46.4)	124 (21.9)	-	
3rd time	51 (7.6)	-	-	
Screening Invitation				0.58
On the phone by the clinic staff	356 (52.8)	251 (44.4)	207 (53.6)	
Visiting the clinic for another reason	160 (23.7)	202 (35.8)	102 (26.4)	
Referred by employer	55 (8.2)	61 (10.8)	62 (16.1)	
Through friends/relatives/spouse	20 (3.0)	28 (5.0)	15 (3.9)	
By the media	35 (5.2)	9 (1.6)	-	
On one's own	48 (7.1)	14 (2.5)	-	

example, one possible reason is that the most commonly used screening method, the Pap test, was often provided by pre- and postnatal services to married women (Couture et al., 2008). In addition, compared to repeat tests, screening participants were more likely to be screened for the first time ($p = 0.001$), and relatively few participants were rescreened. In this regard, the available literature on the example of breast cancer screening highlights that doctors can play an important role in motivating women to participate in initial and subsequent screening, as reassurance by health professionals can reduce women's anxiety and embarrassment and further increase their attendance at regular screenings (Lerman et al., 1990).

Several studies confirm and reinforce the evidence for disparities in adherence to screening for breast and cervical cancer, depending on the level of education (Damiani et al., 2015, Baccolini et al., 2022). This is attributed to the fact that people with higher education usually have a higher socioeconomic status, and the latter additionally leads to improved access to health-related information and health resources (Wardle et al., 2015). However, according to the results acuired, the level of education, as well as screening invitation methods were not considered potential determinants of having screening ($p \leq 0.05$).

The findings showed that in comparison with the majority of men (78.8 %) who underwent screening for PC, almost half of the women who underwent screening for BC and CC had general information. According to the obtained indicators, among the participants in the screening for BC, CC, and PC, women who underwent screening for CC in more than 50 % of cases had a general awareness of the Pap test, while the prevailing part of the participants in the screening for BC and PC in 46.4 % and 78.8 % of cases did not know about mammography and PSA, respectively. This circumstance indicates a low level of awareness of the male population about the importance and necessity of screening for cancer in comparison with women. According to the available literature, men do not seem to be well aware of the benefits of cancer screening (Davis et al., 2012). Therefore, these gender differences underscore the need for the communications campaign and health professionals to review their efforts to improve

advocacy for cancer screening and increase education among men (Davis et al., 2012, Bertakis et al., 2000).

In primary health care settings, successful cancer screening is greatly enhanced by the introduction of organized system features and, to the extent possible, community medicine practices. According to some evidence, two key elements of successful cancer screening in primary care settings are risk assessment and the use of reminders and tracking of cancer screening results (Smith and Oeffinger, 2020). In addition, our results reveal that in more than 42 % of cases, participants received information on screening for BC, CC, and PC from medical professionals.

To date, there is a lack of information on the consequences of waiting for cancer test results, although psychological responses to screening programs have been studied (Chad-Friedman et al., 2017). For example, anxiety, fear and worry are often associated with breast (Kash et al., 1992) and cervical (Eaker et al., 2001). Regarding the results of the questionnaire on subjective feelings while waiting for the screening, our data show that in slightly more than 40% of cases, the participants in the screening for cervical cancer had no feelings / sensations from waiting for it, while almost the same number of participants screening for breast cancer and prostate cancer experienced anxiety before the procedure. Due to the presence of a certain level of excitement during the waiting period, this fact shows the importance of taking preventive measures to reduce the level of emotional stress before the test. For example, the results of some studies note the importance of psychological support in the pre-test period, and they also consider it necessary to inform all screening participants in writing that negative emotional reactions may occur with a positive screening result (Kirkegaard et al., 2018).

According to the results of our survey, the feeling of discomfort from the screening was typical of the participants in the BC (38.1 %) and CC (42.5 %) screening tests. Moreover, participants in the BC/CC screening more than 50 % of cases had anxiety symptoms about the expectations of the test result in comparison with men who participated in the screening of prostate cancer. This finding is consistent with a previous analysis where distress measurements among 2 studies in men reported a low level of distress associated with PSA screening (Cohen et al., 2003, Wilkinson et al., 2008).

Our findings indicate that the knowledge and understanding of the general population of organized screening for BC/CC/PC remain somewhat limited. In fact, the effectiveness and efficiency of screening programs are affected by the extent of participation. The high participation level allows the achievement of a significant impact on public health. Therefore, it is necessary to implement effective measures at the level of PHC facilities, as well as oncological services to increase awareness and motivation of the population of target age groups to undergo preventive cancer screenings (Mereu et al., 2019).

In conclusions, the results of the study demonstrated the reliability and applicability of questionnaires for awareness of the ongoing screening procedure and assessment of subjective feelings. Knowledge of general information about the screening program differs depending on the type of screening. Participants in screening for BC and CC are more likely to be knowledgeable about the screening program than participants in screening for prostate cancer. Getting tested is most often considered an embarrassing experience, especially for screening participants for breast and cervical cancer. Our findings highlight the importance of conducting an information campaign aimed at raising awareness of screening programs, as well as the need to provide patients with full information about the process and possible risks and benefits.

Author Contribution Statement

Conceptualisation: Alfiya Shamsutdinova and Botagoz Turdaliyeva, data curation: Alfiya Shamsutdinova and Shynar Tanabayeva; formal analysis: Botagoz Turdaliyeva; investigation: Alfiya Shamsutdinova, Botagoz Turdaliyeva, Shynar Tanabayeva and Aida Omarova; methodology: Baimakhan Tanabayev, Ildar Fakhradiyev and Timur Saliev; project administration: Alfiya Shamsutdinova; resources: Alfiya Shamsutdinova; supervision: Botagoz Turdaliyeva; validation: Baimakhan Tanabayev; visualisation: Aida Omarova; writing -original draft, and writing– review & editing: Alfiya Shamsutdinova, Shynar Tanabayeva, and Ildar Fakhradiyev.

Acknowledgements

The authors express their gratitude for the administrative and technical support provided by the S.D. Asfendiyarov Kazakh National Medical University.

Ethical Declaration

The study was approved by the Local Ethics Committee of S.D. Asfendiyarov Kazakh National Medical University, Almaty, Kazakhstan (Local Ethics Commission Approval No 4 dated 04.05.2016).

Data Availability

The datasets generated and analysed during the current study are available from the corresponding author on reasonable request.

Study limitation

This study has limitations. Due to the inclusion of only one large city in the survey sample, it is not possible to extrapolate data to the entire territory of Kazakhstan.

Conflicts of interest

The authors declare no conflict of interest.

References

Baccolini V, Isonne C, Salerno C, et al (2022). The association between adherence to cancer screening programs and health literacy: A systematic review and meta-analysis. *Prev Med*, **155**, 106927.

Bertakis KD, Azari R, Helms LJ, Callahan EJ, Robbins JA (2000). Gender differences in the utilization of health care services. *J Fam Pract*, **49**, 147-52.

Cao B, Soerjomataram I, Bray F (2020). The burden and prevention of premature deaths from noncommunicable diseases, including cancer: a global perspective. In 'World cancer report: cancer research for cancer prevention', Eds Wild CP, Weiderpass E and Stewart BW. WHO press, Lyon France, pp 16-22.

Catalona WJ (2018). Prostate Cancer Screening. *Med Clin North Am*, **102**, 199-214.

Chad-Friedman E, Coleman S, Traeger LN, et al (2017). Psychological distress associated with cancer screening: A systematic review. *Cancer*, **123**, 3882-94.

Chung KP, Lai MS, Cheng SH, et al (2008). Organization-based performance measures of cancer care quality: core measure development for breast cancer in Taiwan. *Eur J Cancer Care*, **17**, 5-18.

Cohen L, Fouladi RT, Babaian RJ, et al (2003). Cancer worry is associated with abnormal prostate-specific antigen levels in men participating in a community screening program. *Cancer Epidemiol Biomarkers Prev*, **12**, 610-7.

Couture MC, Nguyen CT, Alvarado BE, Velasquez LD, Zunzunegui MV (2008). Inequalities in breast and cervical cancer screening among urban Mexican women. *Prev Med*, **47**, 471-6.

Damiani G, Basso D, Acampora A, et al (2015). The impact of level of education on adherence to breast and cervical cancer screening: Evidence from a systematic review and meta-analysis. *Prev Med*, **81**, 281-9.

Davis JL, Buchanan KL, Katz RV, Green BL (2012). Gender differences in cancer screening beliefs, behaviors, and willingness to participate: implications for health promotion. *Am J Mens Health*, **6**, 211-7.

Eaker S, Adami HO, Sparén P (2001). Attitudes to screening for cervical cancer: a population-based study in Sweden. *Cancer Causes Control*, **12**, 519-28.

Gassanov Z, Kaidarova D, Ismailov Z, et al (2020). Study of prostate cancer prevalence in Kazakhstan. *Arch Balkan Med Union*, **55**, 582-91.

Hall IJ, Tangka FKL, Sabatino SA, et al (2018). Patterns and Trends in Cancer Screening in the United States. *Prev Chronic Dis*, **15**, E97.

Kash KM, Holland JC, Halper MS, Miller DG (1992). Psychological distress and surveillance behaviors of women with a family history of breast cancer. *J Natl Cancer Inst*, **84**, 24-30.

Kirkegaard P, Edwards A, Larsen MB, Andersen B (2018). Waiting for diagnostic colonoscopy: a qualitative exploration of screening participants' experiences in a FIT-based colorectal cancer screening program. *Patient Prefer Adherence*, **12**, 845-52.

Lerman C, Rimer B, Trock B, Balshem A, Engstrom PF (1990). Factors associated with repeat adherence to breast cancer screening. *Prev Med*, **19**, 279-90.

Mereu A, Concu F, Dessì C, et al (2019). Knowledge about cancer screening programmes in Sardinia. *J Prev Med Hyg*, **60**, E337-42.

Pak R, Sadykova T, Kaidarova D, et al (2021). The Life Quality and Sexual Function of Women Underwent Radical Hysterectomy. *Asian Pac J Cancer Prev*, **22**, 581-9.

Price CR, Hatch LA, Radisic A, et al (2020). Enhancing Adherence to Cervical Cancer Screening Guidelines at a Student-Run Free Clinic. *J Community Health*, **45**, 128-32.

Shertaeva A, Ospanova D, Grjibovsky A, et al (2023). Study on Breast Cancer in Kazakhstan Using the Functional Time Series. *Asian Pac J Cancer Prev*, **24**, 1037-46.

Smith RA, Oeffinger KC (2020). The Importance of Cancer Screening. *Med Clin North Am*, **104**, 919-38.

Soerjomataram I, Bray F (2020). Global trends in cancer incidence and mortality. In 'World cancer report: cancer research for cancer prevention', Eds Wild CP, Weiderpass E and Stewart BW. WHO press, Lyon France, pp 23-33.

Toleutayeva D, Shalgumbayeva GM, Toleutayev TA, Kudaibergenova NK (2022). Knowledge, Attitudes, and Barriers (KABs) of Regarding Colorectal Cancer Screening among the Population of the Republic of Kazakhstan. *Asian Pac J Cancer Prev*, **23**, 2057-63.

Wardle J, Robb K, Vernon S, Waller J (2015). Screening for prevention and early diagnosis of cancer. *Am Psychol*, **70**, 119-33.

Wilkinson S, Warren K, Ramsden A, Matthews A, Chodak G (2008). Do "rapid" PSA assays reduce anxiety and stress of prostate cancer patients undergoing regular review? A prospective evaluation. *Urology*, **71**, 567-72.

Williams JH, Carter SM, Rychetnik L (2014). 'Organised' cervical screening 45 years on: How consistent are organised screening practices?. *Eur J Cancer*, **50**, 3029-38.

Zhang W, Gao K, Fowkes FJI, et al (2022). Associated factors and global adherence of cervical cancer screening in 2019: a systematic analysis and modelling study. *Global Health*, **18**, 101.