



## Knowledge Levels and Life Style Practices for Cancer Prevention among Bangladeshi People

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### Authors' contributions

This work was carried out in collaboration between both authors. Author KC designed the study, performed data collection and data analysis. Author CNR performed data analysis and wrote the manuscript. Both authors read and approved the final manuscript.

### Article Information

DOI: 10.9734/BJMMR/2016/29306

#### Editor(s):

(1) Amosy Ephrem M'koma, Department of Biochemistry and Cancer Biology, Meharry Medical College School of Medicine and Vanderbilt University Medical Center, USA.

#### Reviewers:

(1) Emad A. Shalaby, Cairo University, Egypt.

(2) Annekathryn Goodman, Harvard Medical School, USA.

Complete Peer review History: <http://www.sciencedomain.org/review-history/16515>

Original Research Article

Received 2<sup>nd</sup> September 2016  
Accepted 6<sup>th</sup> October 2016  
Published 12<sup>th</sup> October 2016

### ABSTRACT

**Aims:** This study was conducted to evaluate the knowledge level and life style practices of the respondents on the common cancer risk factors.

**Methodology:** We conducted a cross sectional online survey from December 2015 to May 2016 among the Bangladeshi people. A survey questionnaire was developed based on the WHO country level cancer risk assessment report. 407 respondents were invited randomly using social networks and personal communication to take part into the survey. We included 253 respondents with information of knowledge and current life style practices towards cancer prevention. Age ranges and years of education information were included. After completion of the study statistical analysis was performed by Fisher's Exact Test or Chi-squared test using IBM SPSS Statistics 20.

**Results:** Of the total 253 respondents, only one-third of the respondents irrespective of age groups- No vs. Yes: 96 (37.95%) vs. 157 (62.05%),  $p < 0.00001$  had known that cancer can be prevented by modifying life styles. Female respondents had remarkably lower level of knowledge and perception on specific cancer prevention knowledge compared to their male counterpart.

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About 67% (n=169) and 47% (n=113) of the respondents knew about the impact of chewing or smoking tobacco and non-food grade preservatives, chemicals, ripening agents on developing cancer, respectively; however, only one-fourth (n=73, 28.65%) respondents knew that physical inability or obesity is a risk factor for cancer. Stopped/never smoking, avoid consuming food with food additives / preservatives, alcohol consumption were found the three most common practices among the respondents towards cancer prevention.

**Conclusion:** The study provides important baseline information on preventable cancer risk perception in Bangladesh. The study results indicate that a comprehensive cancer awareness program is needed to reduce the cancer burden in Bangladesh.

*Keywords: Cancer prevention; cancer epidemiology; cancer knowledge; Bangladesh.*

## 1. INTRODUCTION

Cancer is one of the leading causes of morbidity and mortality worldwide. In Bangladesh, every year more than 200,000 people are newly diagnosed cancer and 150,000 people die of the cancer related diseases [1,2]. The number of people developing cancer has been increasing every year because of various factors like tobacco consumption, physical inactivity, consumption of chemically adulterated foods, usage of non-food grade preservatives, ripening chemicals, coloring agents, poor oral hygiene, increasing ageing population, high incidence of oncogenic viral infections etc [3-8]. More than half of those cancers can be preventable by modifying lifestyles [3]. Increasing the awareness of the people through a strong health education program is therefore required to reduce the cancer incidence.

Government of Bangladesh with technical support from World Health Organization has developed and implemented the National Cancer Control Strategy and Plan of Action for 2009-2015 [3]. Notably, developing a national level cancer control strategy is the first step to implement a comprehensive cancer control program in Bangladesh. Cancer prevention is one of the major components of the national cancer control program. Nevertheless, there is still lack of information about cancer risk perception and practices to prevent cancer. Assessing the baseline knowledge and attitude of the general people would facilitate to develop a pragmatic cancer control and prevention in Bangladesh. Hence, the scientific evidence in this regard is important to design and implement an effective cancer prevention awareness program in Bangladesh. The aim of our current study is therefore to comprehend the baseline knowledge, attitude and practice on cancer prevention among Bangladeshi people.

## 2. MATERIALS AND METHODS

### 2.1 Study Design

We conducted a cross sectional online survey from December 2015 to May 2016 among the Bangladeshi people.

### 2.2 Inclusion Criteria and Recruitment Process

The subjects who are aged 15 years or more, having internet access, and currently living in Bangladesh for the last five years or lived in Bangladesh at least six months within last five years were set as inclusion criteria of the survey. Accordingly, a total of 407 respondents were randomly invited using social networks and personal communication to take part into the survey. Survey Invitation links were posted into different internet based social networks like Facebook groups, different online groups such as yahoo groups and google groups, personal emails etc. Only one response from one unique IP address was considered to avoid any duplicate response. Of them, a total 260 (63.88%) respondents were voluntarily participated in the online survey. The survey questionnaire was created on <http://esurv.org/>. After excluding the incomplete and inconsistent survey responses, we included a total of 253 respondents (with an assumed precision of 7% and a confidence interval of 95%) for data analysis.

### 2.3 Data Collection and Statistical Analysis

The survey questionnaire was developed based on the WHO country level cancer risk assessment report [1] to collect required information for evaluating both general and specific knowledge and current life style practices towards cancer prevention. The list of questions asked to assess the cancer prevention

knowledge and practices were given in Table 1. Besides the aforementioned knowledge evaluation information, only the respondents' age ranges and years of education were included. The questionnaire did not contain the name and specific age of the respondent for maintaining the confidentiality. The questionnaire was field tested before the data collection. After completion of the study, all data were encoded into a database. Frequencies of different variable were counted and summarized. Fisher's Exact Test or Chi-squared test was done for categorical variables. A  $p$ -value of  $<0.05$  was considered significant. All tests were performed with IBM SPSS Statistics 20 (IBM Corp., Armonk, NY, USA).

### 3. RESULTS

#### 3.1 Age and Gender Distribution

Of the total 253 respondents, the highest numbers ( $n=91$ , 35.97%) of respondents belonged to 25-34 years age group, followed by 35-44 years ( $n=60$ , 23.71%), 45-55 years ( $n=46$ , 18.18%) and 15-24 years ( $n=44$ , 17.39%) age

groups and the least number of respondents was in 65-74 ( $n=1$ , 0.4%) years age groups. Of the total respondents, 158 were male (62%). The participation of female is lower than male in all age groups except 15-24 years age groups. Notably, the number of female respondents in 35-44 year group is one-fourth of the males. The details age groups and gender distributions are shown in Table 2.

#### 3.2 Education Level

The respondents were divided into three groups based on the completion of currently existing education certification system in Bangladesh: higher secondary school certificate (12 years of schooling), Bachelor or degree course (14 years of schooling), and Masters or above (16 and more years of schooling). As shown in Fig. 1, most of the respondents were completed 16 years or more years schooling ( $n=165$ , 65.22%) followed by 14 years of education ( $n=82$ , 32.41%). A few of the respondents was completed 12 years education ( $n=6$ , 2.37%).

**Table 1. List of questions asked to assess the cancer prevention knowledge and practices**

Knowledge assessment questions	
1.	Do you know that cancer can be preventable by modifying the life style?
2.	Do you know that tobacco chewing/smoking can cause cancer?
3.	Do you know that tobacco chewing/smoking can cause cancer?
4.	Do you know that overweight/obesity can lead to cancer?
5.	Do you know that alcohol consumption can causes cancer?
6.	Do you know that bad oral/mouth hygiene can cause cancer?
7.	Do you know that some viral infections (caused by human papilloma virus, Hepatitis C virus, Human Immunodeficiency virus, HIV etc.) can cause cancer?
Practices assessment	
1.	Stopped smoking within last 12 months / do not smoke
2.	Stopped drinking alcohol/do not drink alcohol
3.	Avoid taking excessive food/oily food to prevent overweight/obesity
4.	Regularly doing some physical exercise to prevent overweight/obesity
5.	Maintaining oral hygiene like brushing teeth, regular dental check up
6.	Trying to avoid taking foods which contain harmful food additives/preservatives, (like formalin)/artificial ripening agent etc.

**Table 2. Age and gender distribution of the respondents**

Age group (year)	Gender		N (% of total population)
	Male, n(%†)	Female, n(%†)	
15-24	18(7.11)	26(10.28)	44(17.39)
25-34	58(22.92)	33(13.04)	91(35.97)
35-44	48(18.97)	12(4.74)	60(23.71)
45-54	25(9.88)	21(8.30)	46(18.18)
55-64	8(3.16)	3(1.19)	11(4.35)
65-74	1(0.40)	0	1(0.40)
75	0	0	0
<b>Total</b>	<b>158 (62.45)</b>	<b>95 (37.55)</b>	<b>253 (100)</b>

†Percentage of the total population (N=253)

### 3.3 Knowledge on Cancer Prevention by Lifestyle Modification

The knowledge of cancer prevention by life style modification was first evaluated based on the positive or negative response. Only one-third of the respondents irrespective of age groups- No vs. Yes: 96 (37.95%) vs. 157 (62.05%),  $p < 0.00001$  had known that cancer can be prevented by modifying their life styles (Table 3). Furthermore, compared to male respondents, a low number female had known that cancer can be prevented by modifying the life style. Then, we assessed the cancer prevention knowledge level by asking six specific questions based on common cancer risk factors. We questioned to the respondents whether they know that tobacco chewing / smoking overweight / obesity, alcohol consumption, poor oral hygiene, viral infections

such as human papilloma virus (HPV), hepatitis C virus infection etc., consumption non-permitted food additives / preservatives, artificial ripening agent can cause cancer. We first examined the frequency distribution of those six different specific cancer risk perceptions. The majority of the respondents (n=169, 66.80%) knew that chewing or smoking tobacco can cause cancer and nearly half of the respondents (n=113, 44.66%) respondents knew that non-food grade preservatives, chemicals, ripening agents is a risk factor for developing cancer, however, approximately one-third of the respondents knew that alcohol consumption, some viral infections, poor oral hygiene (n=98, 38.74%; n=84, 33.20%; and n=79, 31.23%; respectively) can cause cancer. Only one-fourth (n=73, 28.65%) of the respondents knew that physical inability or obesity is a risk factor for cancer.

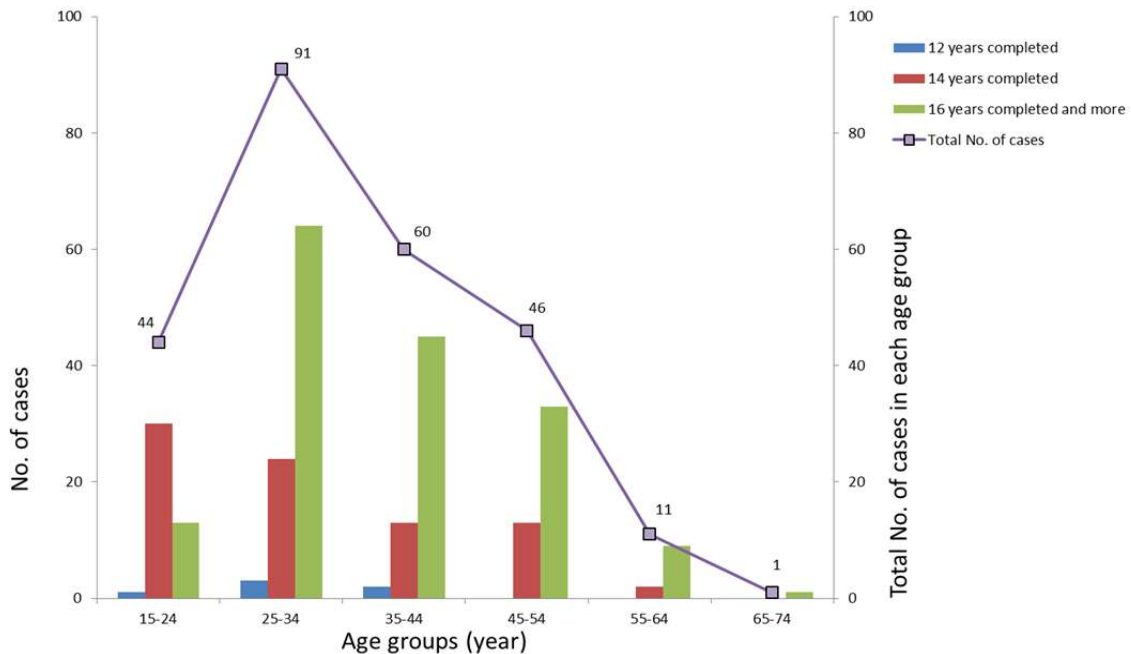


Fig. 1. Education level of the respondents by age groups. The columns illustrate the frequency distribution of respondents' years of education in different age groups

Table 3. Knowledge on cancer prevention by life style modification

Age group (year)	Yes		No		p-value
	n	%	n	%	
15-24	6	2.37	38	15.01	(<0.00001)
25-34	48	18.97	43	17.00	
35-44	41	16.20	19	7.50	
45-54	1	0.40	45	17.79	
55 and above	0	-	12	4.74	
<b>Total</b>	<b>96</b>	<b>37.95</b>	<b>157</b>	<b>62.05</b>	

We then analyzed the difference in knowledge level by gender. We found that female respondents had remarkably lower level of knowledge and perception on specific cancer prevention knowledge compared to their male counterpart (male vs. female,  $p < 0.0001$ ) (Fig. 2). We further analyzed that specific knowledge by years of education of the respondents.

For this, we prepared a simple scoring scale with a minimum score zero (no knowledge) to six (had known all six aforementioned cancer risk factors). Next we divided the respondents of three different years of schooling by three different scores: zero or less than 1, 2 to 3, and 4 or more. We found that irrespective of years of

schooling, more than half ( $n=134$ , 52.96%) of the respondents scored zero or less than one indicating that they don't know or they know only one of those six cancer risk factors. Chewing or smoking tobacco is the most well-known cancer risk factors of those low scored respondents. In contrast, only one-third of the respondents ( $n=93$ , 36.76%) scored 4 and above (Table 4).

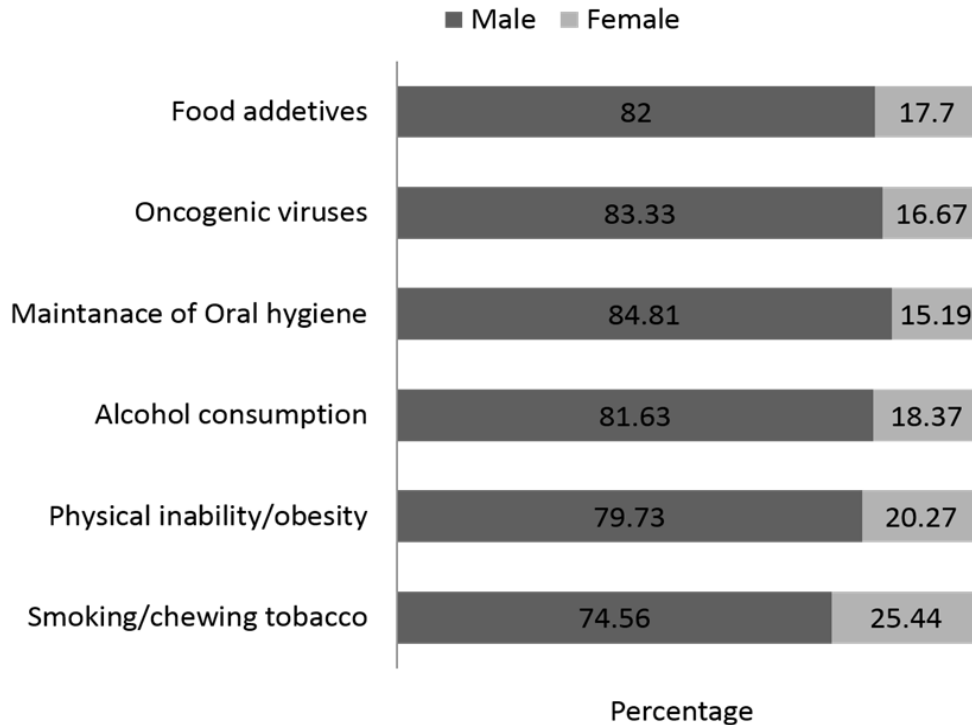
### 3.4 Real Life Practices for Cancer Prevention

We then investigated the respondents' life style practices (if any) for preventing the cancer irrespective of their concerns to factors. The respondents were asked about their cancer

**Table 4. Knowledge score by years of education**

Years of education	Knowledge score (Scale: 0 to 6)					
	≤1		2-3		4-6	
	n	%†	n	%†	n	%†
16 years	77	30.43	20	7.91	68	26.28
14 years	56	22.13	6	2.37	20	7.91
12 years	1	0.40	0	-	5	1.98
<b>Total</b>	<b>134</b>	<b>52.96</b>	<b>26</b>	<b>10.28</b>	<b>93</b>	<b>36.76</b>

†Percentage of the total population (N=253)



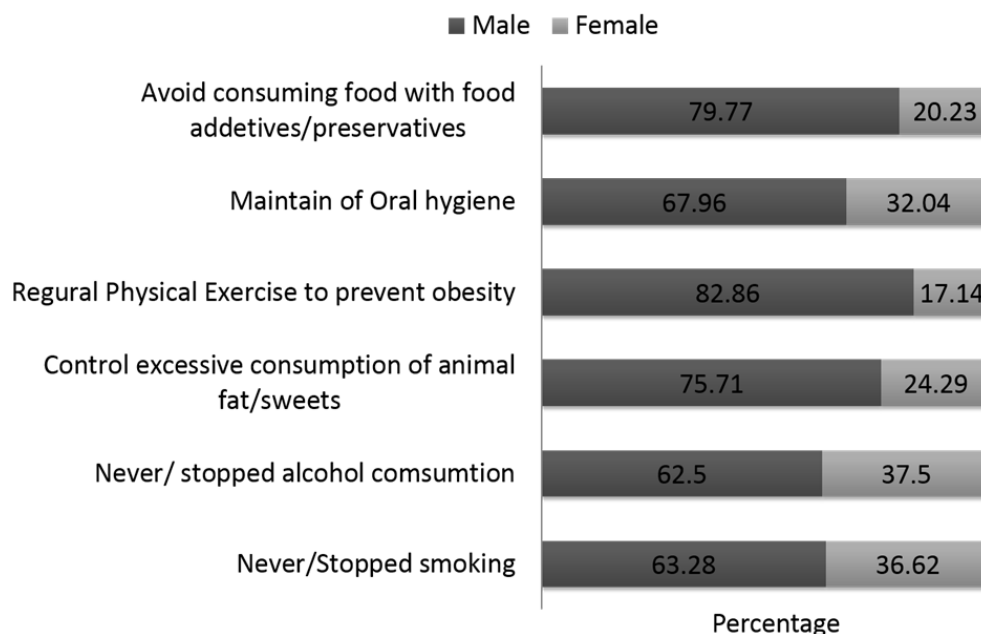
**Fig. 2. Cancer prevention knowledge by gender. The bar charts show the frequency distribution (in percentage) and differences in cancer prevention knowledge in between the male and female respondents**

prevention practices such as smoking practice, alcohol consumption, food habits for taking animal fat and sweets, physical activity, practices for maintaining oral hygiene like daily brushing their teeth, regular dental checkup, attitudes to avoid foods containing food additives/preservatives (like formalin)/ artificial ripening agents etc. Similar to cancer knowledge evaluation, we first examined the frequencies of common lifestyle practices for the prevention of cancer among the respondents. We found that avoid consuming food with food additives/preservatives, stopped/never smoking, alcohol consumption were three most common practices (n=213, 84.19%; n=173, 68.38%; n=168, 66.40%; respectively) among the respondents towards cancer prevention. In contrast, regular physical exercise and control excessive consumption of animal fat/sweets to prevent or reduce obesity are two least common practices (n=70, 27.67% in both) among the respondents. We then examined the differences among the cancer prevention practices among the respondents by gender. We found that cancer prevention practice were low in females compared to male respondents for all six different cancer risk reduction life style practices (male vs. female,  $p < 0.0001$ ) (Fig. 3).

#### 4. DISCUSSION

Cancer management in Bangladesh is still not up-to-the-mark and expensive [3]. The concept of palliative cancer care is also in infantile stage. Hence cancer risk reduction by modifying the lifestyle could be a pragmatic strategy. A well designed health awareness program is therefore essential. To our best knowledge, this the first study to assess the baseline cancer risk perception and life style practices in Bangladesh. Our survey results are therefore worthwhile to get an idea about the cancer knowledge and attitude at population level.

In the current survey, we found that there is still lack of adequate knowledge and awareness among the respondents. Almost two-thirds of the total respondents did not know that cancer can be prevented by lifestyle modification. Notably, more than 95% of the survey respondents completed 14 or more years of schooling. Hence, it is easy to speculate that the basic cancer prevention knowledge among the general population might be even worse than the educated respondents of the current study. Therefore, necessity of a robust cancer awareness program is imperative.



**Fig. 3. Practices towards cancer prevention by gender. The bar charts show the frequency distribution (in percentage) and differences in cancer prevention practices in between the male and female respondents**

In this survey, we have found that female respondents have significantly lower level of cancer risk perception than male. It also reflected in their cancer risk reduction attitudes and practices. Several studies on evaluating the breast cancer knowledge, attitude and practices also reported the low level of cancer prevention knowledge and practices among the female population [7-9]. Lack of appropriate health education, social conservatism, poor motivation for screening often lead to delayed health seeking behavior for cancer management particularly among the females. However, breast cancer and gynecological cancers are the two leading causes of cancers among the females in Bangladesh [5]. Therefore, females should be prioritized in designing and implementing the cancer awareness program.

We observed that besides knowing the risks of tobacco and alcohol consumptions, respondents were also concerned about the risks of consuming non-food grade additives, preservatives that may cause cancers. Continuous mass awareness of print, electronic and social media as well as regular monitoring of respective government authorities are playing a vital role to enhance the people concerns for not taking those adulterated foods. However, law enforcement authorities can play more active roles to stop retailing those adulterated foods particularly in the rural areas. Strong advocacy measures should also be taken to make conscious about the cancer and other health threatening risks of consuming those foods.

Physical inability leading to obesity, maintenance of oral hygiene, lack of knowledge about oncogenic viruses are the important risk factors for cancer, however, those concepts are quite new even in the scientific world. Unlike tobacco smoking, people are not yet quite familiar with those risk factors. We also observed that survey respondents were not quite concern about those risks factors. However, those risks can be easily mitigated by modifying lifestyles, such as regular physical activity, maintenance of oral hygiene, regular dental check-up, screening for oncogenic viruses like human papilloma virus screening of females by cervical smear or hepatitis C virus screening etc. Those measures are not expensive but can contribute significantly in the reduction of cancer morbidity and mortality. Furthermore, we assume that the respondents' positive cancer prevention practices are simply for maintaining their health and general well-being instead completely knowing that those

practices might also be beneficial for preventing the cancer. Regular updating the concerned health professionals and news and social media can play an important role to make aware the general population in this regard.

According the statistics of the International Fund for Agricultural Development (IFAD), the literacy rate in Bangladesh is 58.8% among the people ages 15 and above [10]. As of Nov 2015, the number of internet users was 53,941,000, which is about 33.1% of the population [11]. Most of the people use internet through cell phones. Social network like Facebook is quite popular in both rural and urban areas of Bangladesh. Here our online survey is an indication of usage of social media in medical research and mass awareness as well. Internet based social networks platform for medical research is an interesting modality. It could be an effective public health awareness tool. We may not cover the ultra-poor community through such social network, however, in the future, besides currently mass awareness tools voice mail services through cell phones could be an alternative option to aware that socially deprived group of community.

Our current study has some limitations. First, we did this survey only a small group of people within a particular time period. We assume that as those people are internet users, they belonged to middle class or upper class society in terms of socio-economic status. Our study result therefore may not reflect the cancer knowledge level of the total population of Bangladesh as a whole. However, this survey results may provide some important aspects and baseline concepts for conducting a large scale nationwide survey. Second, this survey was conducted through online by inviting the participants through personal communication through different internet based social network platforms. This is the commonly practiced method of inviting the participants in online survey. Therefore, like any online survey, we could not also avoid the sampling biases; however, we randomly invited the respondents irrespective of age, gender and education level to minimize such biases. Third, this survey has done to assess only the baseline cancer risk perception knowledge on preventable cancers on adults. Thus our survey findings might not reflect the cancer risk perception of hereditary cancers. Despite those limitations, our survey results provide important baseline information and clues on the cancer risk perception of the general population in Bangladesh.

## 5. CONCLUSION

The findings of the survey suggest that the cancer risk perception in Bangladesh is still quite low. Many preventive aspects of cancer management have yet to be addressed to enhance the mass awareness [12]. Implementation of first phase of National Cancer Control Strategy and Plan of Action is an important achievement towards cancer prevention. Nevertheless, national level monitoring and coordination are imperative to further strengthening the cancer control activities in Bangladesh. Non-governmental organizations have been playing a crucial role in strengthening the health system in Bangladesh; however, a few of them have been working on cancer prevention health education [13-14]. NGOs should also take necessary measures to enhance the cancer prevention awareness in Bangladesh. A public-private cooperation based comprehensive cancer education program is therefore needed to reduce the cancer related illness and death in Bangladesh.

## ETHICAL STATEMENT

Written informed consent was obtained from the respondents before participating the survey. The survey was done in accordance with the Declaration of Helsinki.

## ACKNOWLEDGEMENTS

We thanked to all survey respondents for joining the survey.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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*Peer-review history:*  
*The peer review history for this paper can be accessed here:*  
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