1. INTRODUCTION
Cancer is now one of the leading causes of death in Yemen and will become the bombing and leading cause of death in the next years. These gloomy facts notwithstanding, we now understand well the High Risk Factors, and the strategies exist for preventing many of them with help of the governmental and nongovernmental organizations.

Cancer is a major global challenge to human health and social and economic development because it puts a heavy burden on governments, health systems and individuals and causes great pressure on individuals and families as a result of:
1. Low productivity.
2. Disability
3. Risk of early death
4. Increase the burden of expenditure at the individual and family level

2. The economic burden of cancer
Direct costs, which are the most obvious in the cost of health care, such as the cost of hospital stay or travel abroad for treatment and its high costs, in addition to other health services and the cost of medicines and large operations.

Indirect costs arising from loss of productivity due to sickness, disability and early death of cancer patients. All these burdens exacerbated by the effects of national war.

The outline of our Cancer Control Program reflects strategic directions for reducing cancer through an integrated approach to cancer prevention and control and to help the government to achieve national goals in cooperation with the WHO Global Plan of Action for Cancer Control by promoting and developing the cancer registration centers in Sana'a, Aden, Taiz and Hadramout, and the development of prevention and early detection, development of health care management systems, care of telepathic therapy and the development of scientific research programs.

3. Global situation
The global burden of cancer has doubled in the last 30 years of the 20th century and it doubled between 2000 and 2020 and estimated to be triple by 2030. Cancer is expected to overtake cardiovascular disease to become the leading cause of death worldwide.

According to the Globocan 2012 project of the International Agency for Research on Cancer of the World Health Organization, an estimated 14.1 million new cancer cases and 8.2 million cancer deaths occurred in 2012, compared to 12.7 million and 7.6 million respectively in 2008.\[1\]
In Figure 1: The most common cancers worldwide were lung cancer (1.8 million, 13%), breast cancer (1.7 million, 11.9%) and colorectal cancer (1.4 million, 9%). The most common cause of death was as follows:

Lung cancer (1.6 million, 19.4% of the total) and liver cancer (0.8 million, 9.1%) stomach cancer (0.7 million, 8.8%).

According to the same report, new cancer cases are expected to rise to 19.3 million annually by 2025, due to the growth of the world's population. More than half of all cancer cases (56.8%) and cancer deaths (64.9%) in 2012 occurred in the less developed regions of the world, and these rates are likely to increase by 2025.

Cancer is one of the four most common non-communicable diseases: cardiovascular disease, cancer, diabetes and chronic mental illness, which kill more than 36 million people every year. Cancer alone causes about 7.6 million deaths. About 80% (29 million) of all deaths from non-communicable diseases in low- and middle-income countries mean that more than 9 million of all deaths due to non-communicable diseases occur before the age of 60 years, 90% of which occur in low- and middle-income countries such as Yemen.

Cancer incidence and mortality in the next few decades is expected to increase in all regions of the world as a result of the expected changes in the population structure in the next two decades, even if current cancer rates remain unchanged, 12.7 million new cases in 2008 to 21.4 million new cases in 2030, with nearly two-thirds of these cases occurring in low- and middle-income countries.

Cancer is increasingly recognized as a major and growing health concern in the Eastern Mediterranean Region (EMR). Cancer is the fourth leading cause of death in the Gulf region and the Arabian Peninsula. According to WHO estimates, cancer deaths in the Gulf and Arabian Peninsula will rise from 9.4% in 2015 to 12.3% in 2030 of total deaths. The incidence of cancer in the next two decades is expected to double from 456,000 new cases in 2010 to nearly 861,000 in 2030, the highest relative increase among all WHO regions. The above estimates are based on the impact of population growth and aging, as well as increased exposure to cancer risk factors such as smoking, unhealthy diet, physical inactivity and environmental pollution, which will lead to a higher burden of cancer.

Cancer among the Arab population is characterized by high rates of breast, head and neck and hepatocellular carcinoma. Eight prevalence studies found an oral cancer (OC) prevalence ranging from 1.8 to 2.13 per 100,000 persons. Oral cancer patients were mostly in their fifth to sixth decade of life, and the incidence in younger age was reported in some Arab countries. Yemen is have an alarming high prevalence of OC among people younger than 45 years. Eleven studies explored determinants or prognosis of OC. Behavioral determinants such as smokeless tobacco (Shamma and Khat), and cigarette smoking were strongly associated with OC. Alcohol drinking and solar radiation exposures were cited as possible risk factors. The most affected sites were tongue, floor of the mouth, and lower lip variations in the affected site were attributed to the socio-cultural behavior of the populations under study. Squamous cell
carcinoma was the most frequently detected cancer, and usually patients were in late stages (III and IV) at the time of diagnosis.\textsuperscript{[7-13]} Some Arab countries have been characterized by an increase in liver cancer in recent decades due to the high prevalence of viral hepatitis. In Egypt, infection rates were 43.6%, Mauritania 16.4% and Yemen 8.8%.\textsuperscript{[14]}

5. Situation of cancer in Yemen
The cancer problem in Yemen is of a special nature. The average age of cancer is 45 years, about two decades smaller than that of cancer patients in the United States. This can be interpreted as a reflection of the structure of the population pyramid in Yemen, where 32.7% Compared to 20.1% in the United States of America. The ratio of male to female in Yemen is 1.05 with a slight male dominance. This is almost equal to the increase in male cancer incidence of 1.05 compared to females in Yemeni society.

The National Program of Cancer Control started in the last 10 years with limited resources in 4 national cancer centers in Sanaa, Aden, Taiz and Hadramout and activities in Ibb, Hudidah, Sayoun, Shabwah and other governorates with limited activities (Table 1).

Table 1: Distribution population of Yemen according to National Oncology Centers.

<table>
<thead>
<tr>
<th>Centers</th>
<th>Name of the governorate</th>
<th>Population</th>
<th>Area size KM(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Oncology Center</td>
<td>Sanaa, Madinat Sana’a Damar, Hajah, Al-jawf Almahwit, Marib and Sadah</td>
<td>7769600</td>
<td>107405</td>
</tr>
<tr>
<td>Aden Oncology Center</td>
<td>Aden, Abyan, Lahj Dahlia and Al-Bayda</td>
<td>2305700</td>
<td>56777</td>
</tr>
<tr>
<td>Taiz Cancer Center</td>
<td>Taiz , Ibb and Al-Hudidah</td>
<td>6044800</td>
<td>38472</td>
</tr>
<tr>
<td>Hadramout Cancer Center</td>
<td>Hadramout, Shabwah and Almahrah</td>
<td>1587584</td>
<td>325422</td>
</tr>
</tbody>
</table>

According to recent findings from the National Cancer center in Sanaa (2007) reflect the pattern of cancer in Yemen.\textsuperscript{[8]}

In 2007, a total of 3782 cases were registered with an equal male to female ratio and median age at diagnosis of 50 years that was slightly lower among females than males: 47 vs. 50 respectively. Among females, breast cancer was the most common cancer (21%) followed by lymphoma (8%) ovary and leukemia (7% each), while among males the most common cancers were lymphomas (11%), leukemia (9%) and liver, stomach and CNS tumors (7% each). Of all registered cases, there were 437 cancer cases (11.6%) aged 15 years old or less with a median age of 7 years. The most common cancer among children were leukemia (24%), followed by non-Hodgkin's lymphoma (17%) and CNS tumors and Hodgkin's lymphoma (10% each) Tables 2-5.\textsuperscript{[8-9]}

![Figure 2. The 10 most common cancers, Yemen, 2007](image-url)
Figure 3. The 10 most common cancers for female. Yemen, 2007

Figure 4. The 10 most common cancers for male. Yemen, 2007

Figure 5: Relative Frequencies of most common cancers in Sanaa and Hadramout

<table>
<thead>
<tr>
<th>Site</th>
<th>Frequency (%)</th>
<th>Site</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digestive</td>
<td>20.35</td>
<td>Digestive</td>
<td>15</td>
</tr>
<tr>
<td>Breast</td>
<td></td>
<td>Breast</td>
<td>11</td>
</tr>
<tr>
<td>Breast</td>
<td>14.37</td>
<td>NHL</td>
<td>10</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>11.98</td>
<td>CNS</td>
<td>5</td>
</tr>
<tr>
<td>Leukemia</td>
<td></td>
<td>Leukemia</td>
<td>7</td>
</tr>
</tbody>
</table>

A total of 6974 cases were included in study during the period 2007-011 in Aden Cancer Registry showed that 47% were males and 53% females. The overall annual incidence rate was 21.6/100,000 populations; however, the incidence in males was little lower than in females (20.0 and 22.9 per 100,000 populations, respectively).
The top five cancers among males were leukaemia (10.5%), non-hodgkin lymphoma [(NHL), 10.1%], colon (7.5%), Hodgkin diseases [(HD), 6.1%] and stomach cancer (5.1%). For females, breast cancer was the top (30.0%), followed by leukaemia (7.6%), NHL (6.6%), colonic (4.9%) and ovarian cancer (4.5%).

The findings of the ACR in Yemen (1997 –2011) showed that the increases in reporting cancer incidence rates over the 15-year period were attributable to changes that occurred to the cancer registry's functionality. It is also a result of the improved diagnostic methods used in different healthcare centres in the country. Data included in this study will provide the basis for evaluating priorities for cancer control in Yemen.[10]

6. Factors to increase cancer in Yemen

There are many important factors to increase rates of cancer, being one of the non-communicable diseases, smoking, unhealthy diet, physical inactivity and harmful use of alcohol and chemicals.

A study was conducted in Yemen the results were:

• 28% of Yemen's population are current smokers
• 80% do not exercise physically.
• 95% consume less than 5 servings of fruits and vegetables a day.

7. Financing the care of cancer patients

Taking reasonable steps in cancer prevention and early detection will reduce the burden of cancer and the cost of caring for cancer patients. This requires the implementation of measures to activate the adoption program adopted by the Parliament council prior to the war of 2015 such as an increase in taxes on products of tobacco and smoking in closed public places and means of transport, attended different types of advertising on the promotion, promotion and sponsorship, stop the sale of tobacco products to minors and direct supervision by the Ministry of Agriculture on the optimal use of pesticides and chemicals in the cultivation of vegetables, fruits and khat, must also fight eating unhealthy diet, physical activity and harmful use of alcohol, and equally of equal importance, and raise public awareness about healthy lifestyle, and how individuals' health is exposed to different risk factors.

Technological development has become very expensive, especially in the field of radiotherapy and targeted drugs, which has led to a significant increase in the cost of care for the patient and has resulted in a high degree of challenge for the care of cancer patients.

Public health expenditure must be increased to provide high-quality treatment services along with cost-effective interventions and prevention at different levels of health care, thereby reducing people's expenditures, and this will have a direct impact on making care available to the poorest sector of the population.

Cost effectiveness is one of the tools that must be used to prioritize health care expenditure while measuring health outcomes by calculating disability deficits and years of productive life added.

Cost-effective approaches will help to propose effective health interventions to achieve optimum health outcomes with budget constraints. The WHO Macroeconomics and Health Committee suggested that interventions costing less per capita GNP were “very cost effective” and that ranging from one to three times GNP per capita is “cost-effective” and further studies and research are needed in this area to develop appropriate effectiveness for Yemen.

Guidelines for country-based evidence-based management of common cancers at the national level, as well as guidelines for making free or subsidized treatment through public hospitals on the basis of economic need, should be developed and adopted.

Internationally approved alternative drugs should be used if available if public funds are used to finance their purchase.

8. Health workforce to care for cancer patients

Cancer care services will be of little value unless there is a availability of highly qualified health care providers that ensures effective care for cancer patients continuing training courses and staff capacity building must be mandatory to enhance available human resources capabilities and optimize access to health care should be given special attention is given to primary health care providers who need training to improve their performance and to provide and improve the quality of care. This can be done through the establishment of training centers in collaboration with national academic institutions.

Training courses are needed in recording the coding summary and accreditation of registrars to build a strong cancer record within healthcare delivery facilities.

9 - Access to essential medicines and medical techniques

The availability of medicines and other health technologies for cancer depends on the efficiency of the health care system. Good needs prediction is a prerequisite for building an effective and wider system to enable effective response to the health needs of the population and to optimize the use of resources. Databases that are constantly updated based on information obtained at the point of care, collection of epidemiological data, research and the use of available data in national cancer centers (Aden, Sana’a, Hadramout).

10. Information and research

Establish a national infrastructure to coordinate cancer research and strengthen surveillance to monitor the spread of disease and survival, and document the quality
of cancer services and their outcomes according to international guidelines and in collaboration with world Health organization.

11. Health Care System for Cancer Patients
In accordance with the World Health Organization Global Plan of Action for the Prevention and Control of Non-communicable Diseases, prevention and early detection services should be provided at the primary health care level.

This level must be strongly linked to secondary and tertiary levels of care through dual referral systems that are well established and strong. To achieve these objectives, there must be a contiguous government health service with a well-trained workforce.

Primary health care is the foundation for cancer care. It is the most cost-effective way to combat cancer. Primary health care includes the implementation of cancer control programs to educate the public, early detection of the most common cancers, appropriate referral of suspects and early to secondary or specialized centers and follow-up of cancer cases treated and palliative care. At this level there should be counseling in primary prevention, immunization (against hepatitis and HPV), increased awareness, especially for the detection of breast cancer, and examination of the visual pathway with acetic acid for cervical cancer. A model of dedicated nurses can be adopted for non-communicable diseases to do some of it.

For diagnostic procedures referral to secondary care hospitals at the district level is the referral point for tertiary care at the county level. Secondary care includes facilities for the diagnosis of common cancers including X-ray and ultrasound, diagnostic endoscopy services, and basic pathology services, including sampling and pathology analysis. This type of care is also involved in the long-term follow-up of patients treated in specialized hospitals and oncology centers and will providing free of charge palliative care. This should be linked to global health care, rehabilitation and CME systems.

12. Specialized cancer treatment centers
If the above level is not at an acceptable level, the alternative model is to work on intensifying and strengthening the specialized small cancer centers at the district level, we mean in ibb, Sayoun, Lahj, shabwah, Abyan and other governorates).

Many low- and middle-income countries have developed comprehensive cancer centers with public and / or private resources. These model centers help establish best management practices and provide clinical and basic services to meet cancer patient needs. Providing a range of specialized human and technical resources that allow these centers to provide best practices for cancer treatment and control for large population areas. Best patient care practices can be managed directly in these centers with control.

It is also possible in these centers to educate health care professionals and the public and conduct research on the causes, prevention, diagnosis and treatment of cancer.

These centers can serve as focal points for cancer control.

Finally, cancer should be treated in specialist centers. To be ideal, patients should be treated in evidence-based ways in multidisciplinary clinics, surgeons, radiologists, and medical tumors supported by radiological, laboratory, cellular and support services.

Also, in order to be comprehensive, they must have population-based cancer records with involvement in cancer research (epidemiology, basic and clinical), treatment of patients requiring multidisciplinary care, complex surgery and radiation therapy, combination chemotherapy and bone marrow transplantation and other advanced treatment methods.

13. Analyze the current situation Challenges and opportunities
The first step in cancer control planning is to assess the current status of the cancer problem and activities or cancer control programs.

One of the major challenges in the health care system in Yemen is the complexity and intertwined with a large number of public stakeholders involved in management, financing, and care provision, which is now being avoided in the new health insurance system, based on different levels of health care.

There are also many obstacles to achieving effective care in Yemen. One of the main obstacles is inadequate education for health care providers and the public as well as financial constraints that hinder improved diagnosis and early detection of cancer.

13.1. Inequality in distribution
The distribution of cancer centers providing services to cancer patients shows a large pattern of inequality, which is reflected in the concentration of these centers in Sana’a and major cities with the concentration of trained medical professionals in the same areas, leaving the minimum services in remote areas, leading to the suffering of some patients from travel for more than 500 km to access medical advice and radiation therapy.

Health authorities are currently adopting a new initiative to bring highly qualified medical professionals in all specialties to work in hospitals located in remote areas, giving part of their time to cancer control activities.

Although there is a national cancer registry in Aden and Sana’a, a well-established system for collecting and disseminating reliable data on the incidence and spread of cancer at the national level, this record faces a major modern challenge that does not collect data at a single
central level (compatibility of different sources of data) to be compiled, analyzed and issued through a single entity.

All activities undertaken to meet the purposes of cancer control should be carried out within the framework of the National Strategic Plan for the Prevention and Control of Non-communicable Diseases, which ensures equity among all populations, sustainability and the use of evidence-based approaches.

Six key elements of the national plan for combating cancer in Yemen are:
- National registration
- Prevention
- Early detection
- Administration
- Palliative care
- Scientific Research

14. The main objectives of the National Cancer Control Plan
1. Extending the scope of the National Cancer Registry program
2. Prevention of exposure to cancer factors
3. Application of practical software for early detection
4. Improve the quality of life and maintain the lives of cancer patients through proper management according to international standards.
5. Establish a palliative care program for pain relief programs.
6. Promote national cancer research

14. 1. Expansion of the National Cancer Registry program
The sound statistics of cancer are the key element in any cancer strategy. Yemen has the National Cancer Registry program established since 1998 (Aden Cancer Registry). The statistics have been well established and national and regional infection rates have been published with the expectation of the magnitude of the problem for the next three decades. Stability of statistics and quality of results. The use of data and results registration should be encouraged through a wide range covering various analyzes in the year of medical statistics, such as descriptive, laboratory and cash analyzes. It also includes health service research, taking into consideration the principles of health economics and monitoring.

14.2. Prevention of exposure to cancer factors
Among the most important factors that are modified to share risk factors of cancer and all other chronic diseases.
1. Tobacco use.
2. Diet is not properly eat a few fruits and vegetables.
3. Increase weight and obesity.
4. Chewing khat, shammah and Zardah
5. Improper use of chemicals and pesticides in agriculture uses

Other factors contributing to cancer include exposure to:
- Physical factors carcinogenic such as ultraviolet radiation.
- Cancer-causing chemicals, such as food contaminants (aflatoxins) or occupational pollutants (asbestos).
- Biological carcinogens, such as infection by viruses, bacteria and parasites (HPV and hepatitis B-C).

Cancer prevention is aimed at controlling the cancer risk factors that have been identified, especially those that can be modified. This depends mainly on individual behavior, and it is possible through public health measures to address unhealthy lifestyles and environmental pollution. Therefore, cancer prevention policies integrated into the general context of social and economic development in the country, and look beyond the health sector. The success of this preventive component is fundamentally dependent on multisectoral collaboration with world Health Organization and other NGO.

According to the latest WHO reports on tobacco control (2015), which shows the latest analysis of the current status of tobacco control measures in Yemen, two key interventions are required to achieve the 2025 global target with a relative reduction of 30% in tobacco consumption:
1. Protect people from exposure to second hand smoke.
2. Advertising on tobacco products, promotion and sponsorship.

Promoting a healthy lifestyle is more likely to be particularly effective if it is in collaboration with multiple non-health sectors such as the Ministry of Supply and Internal Trade, the Ministry of Education, the Ministry of Higher Education and research, the Ministry of Industry, the media, the Ministry of Communications.

As Yemen is one of the countries with the highest prevalence of hepatitis, the virus is at higher risk of infection. This high prevalence is behind the high prevalence of liver cancer in Yemen.\[9\]

- Hepatitis B: Hepatitis B vaccine is the best cost-effective strategy for the prevention of liver cancer and has now been integrated into the National Expanded Vaccine Program.
- Implement international standards for injection and infection control practices in all health care services to reduce the spread of viruses.
- Educate the public about viral hepatitis and its deadly effect on health and how it can be avoided by implementing behavioral change strategies in unsafe injection practices and multiple sexual practices.

Expanding the provision of new generations of drugs to treat hepatitis infection to prevent the development of liver cancer.
Early detection is part of a broader strategy, including diagnosis, treatment and follow-up.

15. CONCLUSION
If we consider what has been stated by WHO, there is an urgent need to complete buildings of cancer centers in Aden, Hadramout and with cooperation of WHO to bring urgently the radiotherapy machines for Cancer centers in sanaa, Aden and Hadramout. In countries of the Eastern Mediterranean Region, the increasing magnitude of cancers calls for urgent action to initiate prevention and control measures. This could be achieved by increasing cancer registers by health ministries where all institutions (public and private) would send relevant information regarding all patients with a confirmed diagnosis of cancer. The working on national strategy of cancer control program will play important role to cover urgent needs of the patient and decrease burden of cancer in Yemen.

REFERENCES