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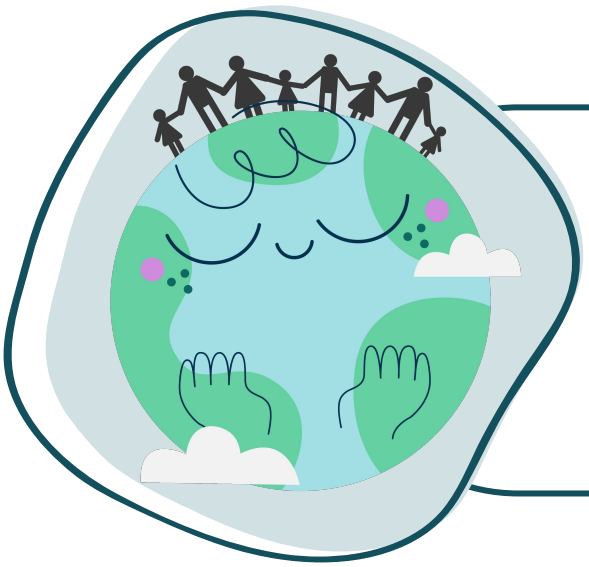

Cancer

Objectives

- Appreciate the global impact of cancer.
- Identify the most prevalent cancers worldwide, in the region and in KSA.
- Identify the leading causes of cancer deaths.
- Understand the cancer control continuum and explain its implication to public health.
- Screening for cancer.
- Understand and reflect the Kingdoms efforts to control the rising burden of Cancers in KSA.
- Explain important factors and trends affecting cancer control and directions for future research.

Color Index

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Editing File

Impact of Cancer

TRUE OR FALSE?

- **True or False:** Large percentage of cancers are preventable.
- **True or False:** Preventing cancer is easier than treating cancer.
- **True or False:** Screening tests are recommended for most cancers.

The Global impact of cancer:

In 2010 total annual economic cost of cancer was approximately 1.16 trillion US$.

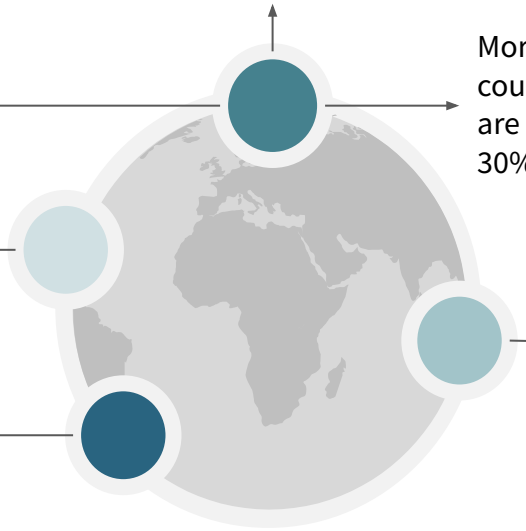
2nd leading cause of death globally

More than 90% of high-income countries reported treatment services are available compared to less than 30% of low-income countries.

In 2018, 18.1 million new cases and 9.6 million deaths (26,300 death/days)

Late-stage presentation and inaccessible diagnosis and treatment are common.
In 2017, only 26% of low-income countries reported having pathology services generally available in the public sector.

One in 5 men and one in 6 women develop cancer during their lifetime and one in 8 men and one in 11 women die from the cancer.



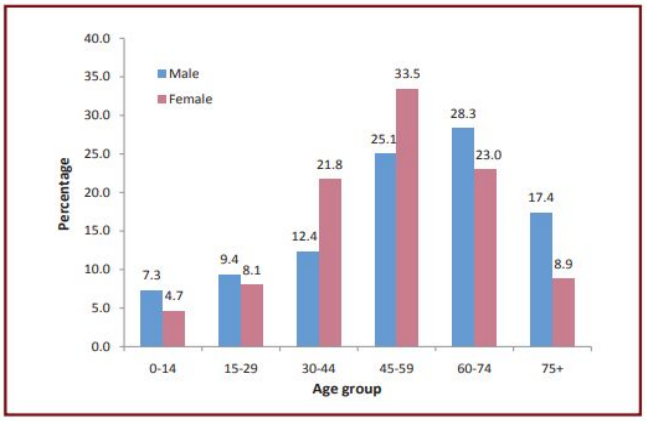
Most Prevalent Cancers: [1]

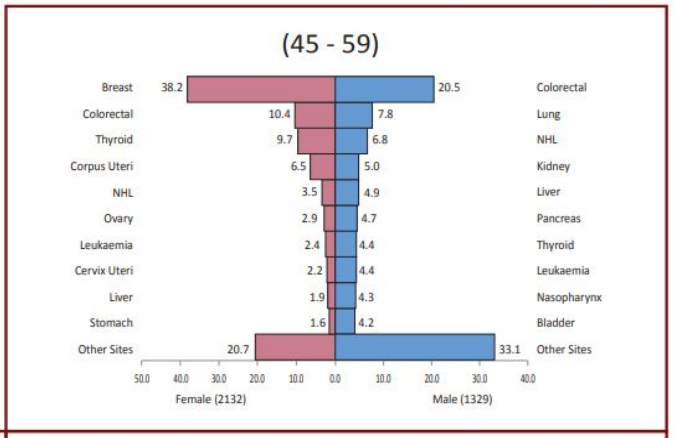
Region	World				Middle East and North Africa				Saudi Arabia			
Cause	Men		Women		Men		Women		Men		Women	
	Incidence	Mortality	Incidence	Mortality	Incidence	Mortality	Incidence	Mortality	Incidence	Mortality	Incidence	Mortality
1st	Lung		Breast		Lung		Breast		Colorectal		Breast	
2nd	Prostate	Liver	Colorectal	lung	Prostate	Liver	Colorectal		Lymphomas, multiple myeloma		Colorectal	
3rd	Colorectal	Stomach	lung	Colorectal	Bladder	Prostate	Thyroid	Lung	Prostate	Lung	Thyroid	Lymphomas, multiple myeloma
4th	Stomach	Colorectal	Cervical		Colorectal		Non-Hodgkins	Stomach	Lung	Liver	Lymphomas, multiple myeloma	Leukemia
5th	Liver	Prostate	Stomach		Liver	Bladder	Ovarian	Liver	Leukemia		Uterine	Liver

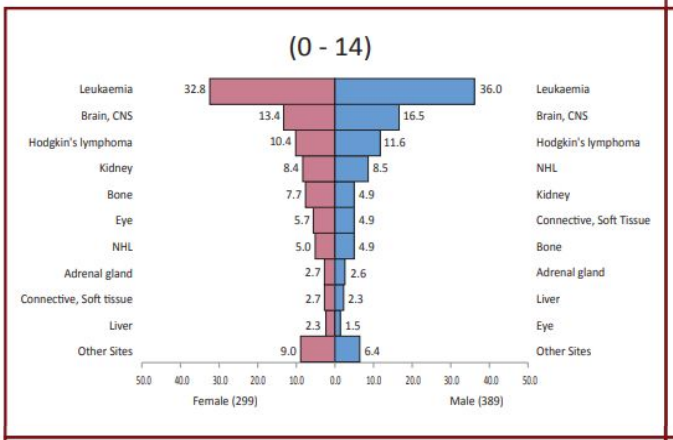
1. Cervical cancer incidence is very low in Saudi Arabia because of religious prohibition of unlawful sexual intercourses since HPV is a STD.

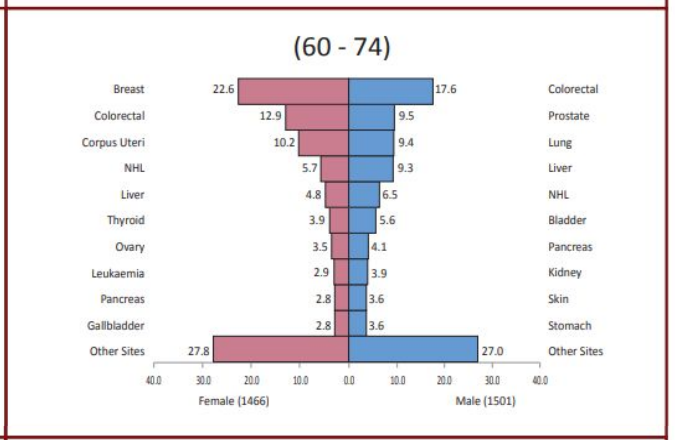
Impact of Cancer

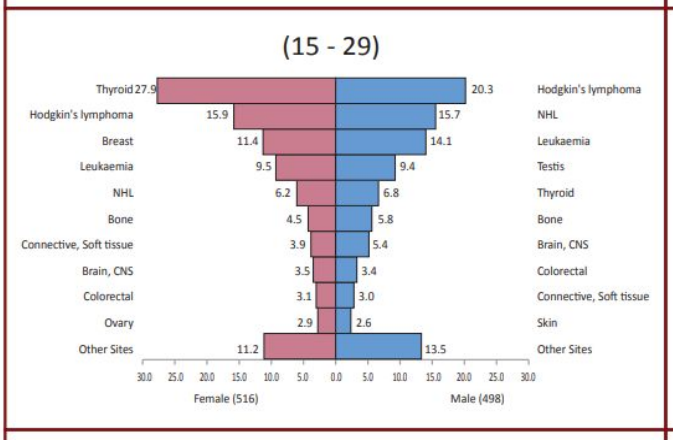
Cancer Cases in KSA distributed by Age and Gender

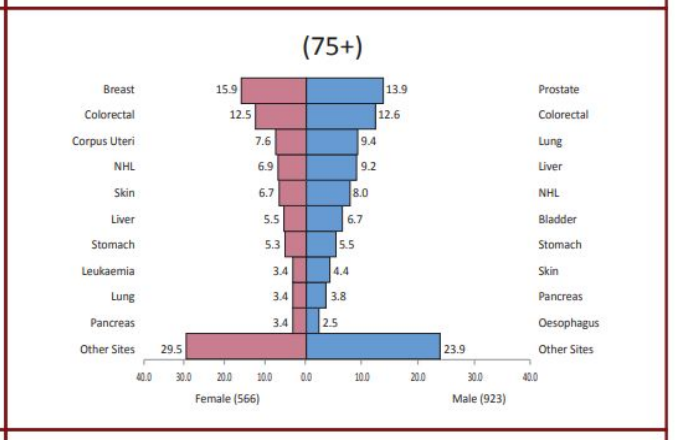


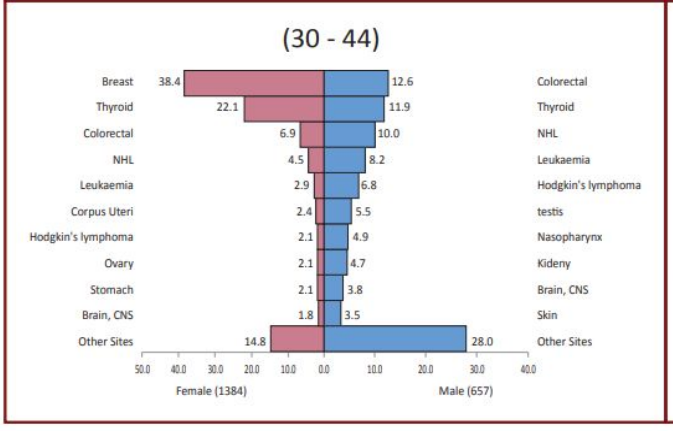


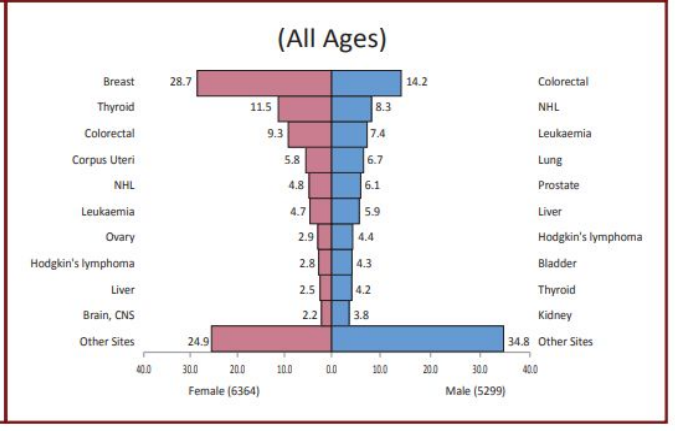




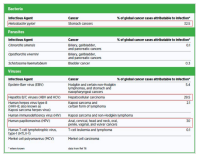


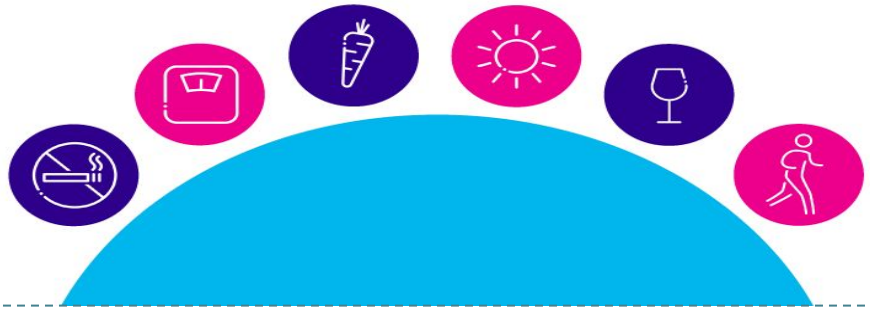






Causes of Cancer

Causes of Cancer	
Cancer is the result of the interaction between a **person's** factors and **3** categories of **external agents**	
Personal Factors	
Genetic [1]	Example: Family Hx and oncogenic genes
Age	Through two main mechanisms: **A-** Cellular repair mechanisms become less effective as a person grows older. **B-** Accumulation of external risk factors. [2]
External Factors	
Physical Carcinogens	Example: Ultraviolet and ionizing radiation.
Chemical Carcinogens [3]	Example: • Asbestos, components of tobacco smoke, • aflatoxin (a food contaminant), and arsenic (a drinking water contaminant). (also in rice so wash carefully) • Diethylstilbestrol (DES) hormone is associated with vaginal adenocarcinoma
Biological Carcinogens 	Example: • Bacteria → **H. pylori** causing stomach cancer • Parasites → **S. haematobium** causing bladder cancer → C. sinensis causing biliary, gallbladder and pancreatic cancer → O. viverrini causing biliary, gallbladder and pancreatic cancer • Viruses → EBV causing hodgkin and non-Hodgkin lymphoma, stomach and nasopharyngeal cancer → **Hep B/C** causing hepatocellular carcinoma → HHV-8 causing kaposi sarcoma and certain form of lymphoma → HIV causing Kaposi sarcoma and non-Hodgkin lymphoma → **HPV** causing anal, cervical, head, neck, oral, vaginal and vulvar Cancers → HTLV-1 causing T-cell leukemia and lymphoma → MCV causing Merkel cell carcinoma



1. Genetic testing has become crucial in some family related cancers such us BRCA1 and BRCA2 gene testing for breast and ovarian cancers
2. As the person grows he accumulates more risk factors such as exposure to chemical carcinogens , UV radiation ...etc
3. Asbestos can lead to mesothelioma and aflatoxin can increase the risk for liver cancer

Cancer Control Continuum

- The cancer control continuum **describes the various stages** from cancer etiology, prevention, early detection, diagnosis, treatment, survivorship, and end of life.
- The cancer control continuum is **a useful framework** to view plans, progress, and priorities.
- It helps us **identify research gaps**, where we must collaborate with others to have an impact, and where more resources may be needed

Cancer Control Continuum

Prevention	Early detection	Diagnosis	Treatment	Survivorship	End-of-Life care
• Tobacco control • Vaccination • Diet • Physical activity • Sun exposure • Viruses exposure • Alcohol • Chemoprevention	• Screening • Awareness campaigns	• Oncology consultations • Tumor staging • Patient counseling and decision making	• Surgery • Chemotherapy • Radiotherapy • Immunological therapy • Adjuvant therapy • Symptom management • Psychosocial care	• Long-term follow up • Late-effects management • Rehabilitation • Coping • Health promotion	• Palliation • Spiritual issues • Hospice [1]

Cross-cutting issues

- Communication, decision making, quality of care, health equity, and family/caregiving

Screening for Cancer

Wilson-Jungner Criteria for Screening program:

1. The condition being screened for should be an **important health problem**.
2. The **natural history** of the condition should be **well understood.**
3. There should be a **detectable early stage**.
4. **Treatment at an early stage** should be of **more benefit** than at a later stage.
5. A **suitable test** [2] should be devised for **the early stage**.
6. The test should be **acceptable**.
7. **Intervals** for **repeating** the test should be determined.
8. **Adequate health service** provision should be made for the extra clinical workload resulting from screening.
9. The **risks**, both physical and psychological, **should be less than the benefits**. [3]
10. The **costs** should **be balanced** against the **benefits**

1. Hospice care is a type of health care that focuses on the palliation of a terminally ill patient's pain and symptoms and attending to their emotional and spiritual needs at the end of life.
2. An example of suitable test is measurement of PSA levels. An example of an unsuitable test is bone marrow biopsy.
3. For example, mammogram can be painful the women; however, when comparing it to the danger of breast cancer and the benefit of early screening we'll notice that the benefits outweigh the risks

Screening for Cancer

USPSTF Recommendation grades:

This table is for understanding the grades of recommendations

Grade	Recommend / against	Evidence from literature	Benefit to patients
A	Recommend	high	substantial
B	Recommend	high	moderate
		moderate	Moderate to substantial
C	Recommend selectively based on professional judgment + patient preferences.	moderate	small
D	against	Moderate to high	No benefit or harm>benefit
I	Unknown	Lacking, or poor quality, or conflicting	Benefit? Harm?

Breast Cancer Screening Recommendations

Population	Recommendations	Grade
40 to 49 years	The decision to start screening mammography in women prior to age 50 years should be an individual one. Women with a parent, sibling, or child with breast cancer are at higher risk for breast cancer and thus may benefit more than average-risk women from beginning screening in their 40s.	C
50 to 74 years	Biennial screening mammography for women aged 50 to 74 years.	B
75 years or older	Current evidence is insufficient to assess the balance of benefits and harms of screening mammography in women aged 75 years or older.	I

Colon Cancer Screening Recommendations

Population	Recommendation	Grade (What's This?)
Adults aged 50 to 75 years	The USPSTF recommends screening for colorectal cancer starting at age 50 years and continuing until age 75 years.	A
Adults aged 76 to 85 years	The decision to screen for colorectal cancer in adults aged 76 to 85 years should be an individual one, taking into account the patient's overall health and prior screening history. • Adults in this age group who have never been screened for colorectal cancer are more likely to benefit. • Screening would be most appropriate among adults who 1) are healthy enough to undergo treatment if colorectal cancer is detected and 2) do not have comorbid conditions that would significantly limit their life expectancy.	C

Screening for Cancer

Colorectal Cancer Modalities and Frequency

Test	Frequency (years)
Guaiac-based Fecal Occult Blood Test (gFOBT) looks for **heme**	1
Fecal immunochemical test (FIT) looks for **globin**, more sensitive than gFOBT	1
FIT-DNA*	1-3
Colonoscopy**	10
CT-colonography	5
Flexible sigmoidoscopy**	5
Flexible sigmoidoscopy +FIT	10

*Can detect altered DNA in the stool.
**Common side effects of colonoscopy/sigmoidoscopy: perforation, bleeding, and infection.

Cervical Cancer Incidence in KSA

Table 3: Cervical cancer incidence in Saudi Arabia (estimates for 2012)

Indicator	Saudi Arabia	Western Asia	World
Annual number of new cancer cases	241	4,455	527,624
Crude incidence rate[a]	1.9	3.8	15.1
Age-standardized incidence rate[a]	2.7	4.4	14.0
Cumulative risk (%) at 75 years old[b]	0.3	0.5	1.4

Cervical Cancer Screening

Age group	Pap smear (cytology)	HPV testing	Grade
<21 years	Against screening		D
21-30 years		Against	D
	Recommended every 3 years		A
30-65 years	Recommended every 3 years		A
	Or recommend pap + hpv every 5 years		
>65 years	against screening if have had adequate prior screening and are not otherwise at high risk for cervical cancer.		A
Had Hysterectomy + removal of cervix + no prior high-grade precancerous lesion (CIN grade 2 or 3) or cervical cancer.: Against			D

Define "Adequate" cervical cancer screening?

Very Important!!

- **3 consecutive negative cytology (Pap smear) results.**
- **2 consecutive negative HPV results within 10 years before cessation of screening, with the most recent test occurring within 5 years.**
- **Screening may be clinically indicated in > 65 years for whom the adequacy of prior screening cannot be accurately assessed or documented.**
- **Secondary prevention of cervical cancer → pap smear every 3 years** (the main type of prevention nowadays and usually starts at 21 years old)
- **Primary prevention of cervical cancer → improve personal hygiene and birth control.** Gardasil 9 is an HPV vaccine approved by the U.S. Food and Drug Administration and can be used for both girls and boys. This vaccine can prevent most cases of cervical cancer if given before a girl or woman is exposed to the virus.**STD prevention, HPV vaccine hasn't been added in our guidelines yet**

Screening for Cancer

Screening for Hematological Malignancy

- There are **no routine screening tests** for hematologic malignancies (Lymphoma, Leukemia, .. etc)
- It is typical for a patient to seek medical treatment when symptoms appear.
- Can be discovered incidentally when a blood test (leukocytosis) is ordered for another reason

Screening for Lung Malignancy

Most common malignancy in men worldwide

- **Screening patients for smoking:**

1. Ask all your patients systematically if they smoke or not. Make it part of their **vital signs**.
2. If a smoker is identified, implement smoking cessation guidelines. (which is the 5A's)

- **Screening for Lung Cancer:**
  - Age 55–77 years.
  - Smoking history ≥ 30 Pack Years.
  - **And** Active smoker or quit smoking less than 15 years ago.
  - Did not have chest CT scan the last year.
- **Screening modality: Low dose chest CT scan**.
  → Conventional chest CT radiation dose (7-8 mSv), low dose chest CT (1.4 mSv).

Screening for Prostate Cancer

- Men should have an opportunity to **discuss** the potential **benefits and harms** of screening with their clinician. **(Individualized choice)**
- Screening offers a **small potential benefit of reducing the chance of death** from prostate cancer in some men.
- Many men will experience **potential harms of screening**, including **false-positive** results that require additional testing and possible prostate biopsy; **overdiagnosis** and overtreatment; and treatment complications, such as **incontinence and erectile dysfunction**.

Population	Recommendation	Grade
Men aged 55 to 69 years	The decision to undergo periodic prostate-specific antigen (PSA)-based screening for prostate cancer should be an individual one.	C
Men 70 years and older	The USPSTF recommends against PSA-based screening for prostate cancer in men 70 years and older.	D

Screening for Thyroid Cancer [1]

patient tend to be asymptomatic

Population	Recommendation	Grade
Adults	The USPSTF recommends against screening for thyroid cancer in asymptomatic adults.	D

1. What we mean by screening is screening for asymptomatic people as a mean of secondary prevention. If the patient is symptomatic (has a goiter or hyperthyroidism) then we need to perform diagnostic tests for him.

Screening for Cancer

Screening for Liver Malignancy

- Patients with **cirrhosis** of any etiology, but especially cirrhosis caused by **hepatitis B or C,** are at high risk for the development of HCC and these patients should be the targets for a screening program.
- The best screening modality is **ultrasound** of the liver. Every 6 months

Screening for Uterine Malignancy

- **No evidence that screening reduces mortality** from uterine (endometrial) cancer.
- Most cases of endometrial cancer (85%) are diagnosed at an early stage because of symptoms [1], and survival rates are high.

Screening for Ovarian Cancer

Population	Recommendation	Grade
Asymptomatic women	The USPSTF recommends against screening for ovarian cancer in asymptomatic women. This recommendation applies to asymptomatic women who are not known to have a high-risk hereditary cancer syndrome.	**D**

- Example of a high-risk hereditary cancer syndrome, women with **BRCA1 or BRCA2** genetic mutations associated with **hereditary breast and ovarian cancer.**
- **Symptoms:**
  - **Menopause**
  - **Vaginal bleeding after menopause**

KSA Efforts to Control The Rising Burden of Cancer

- Cancer Control Program Ministry of Health
- Saudi Cancer society.
  Link: http://saudicancer.org/index.php
- National program for early detection of breast cancer.
  Link: http://www.bc-moh.com/
- King Fahad National Centre for Children's Cancer
  Link: https://www.kfshrc.edu.sa/en/home/hospitals/riyadh/kfnccc
- Sanad Children's Cancer Support Association
  Link: http://www.sanad.org.sa/
- **In Saudi Arabia there is no countrywide policy for colorectal screening despite the increasing incidence of the disease.**

1. Symptoms include: unusual vaginal bleeding, spotting, or discharge. For premenopausal women, this includes menorrhagia, which is an abnormally heavy or prolonged bleeding, and/or abnormal uterine bleeding.

Factors Affecting Cancer Control and Future Research

Factors Affecting Cancer Control

The following are important factors and trends affecting cancer control and the directions of future research

1- Tobacco Use

- **Raise tobacco taxes** to at least prevent tobacco products from becoming affordable.
- Tax all tobacco products to prevent consumers switching from highly taxed products to less taxed ones.
- Require by law and Enforce **100% smoke-free environments** in all indoor workplaces and public places.
- Put **health warnings** on all tobacco packaging.
- Establish a **national pilot cessation** program in health-care facilities
  - https://www.moh.gov.sa/Ministry/Projects/TCP/Pages/default.aspx / **CALL 937**
- **Build media awareness** of both the addictive nature of tobacco use and treatment options.

2- Unhealthy Diet, Physical Inactivity, Overweight and Obesity

- **Develop and implement national dietary guidelines** and nutrition policies.
  - Example: Restaurants should put calories.
- **Promote educational and information campaigns** about reducing salt, sugar and fat consumption.
- Develop and implement **national guidelines on physical activity**.
- Implement community-wide **campaigns** to promote the benefits of physical activity.
- **Promote physical activity** in workplaces. (give discount for gym subscriptions)

3- Alcohol

- Raise public awareness, especially among young people, about alcohol-related health risks, including cancer.

4- Hepatitis B Virus

جدول التطعيمات الوطني

التطعيم Vaccine		الزيارة Visit
• BCG	• وزن	عند الولادة At Birth
• Hepatitis B	• التهاب كبدي (ب)	
• IPV	• شلل أطفال معطل	عمر شهرين 2 months
• DTaP	• الثلاثي البكتيري	
• Hepatitis B	• الالتهاب الكبدي (ب)	
• Hib	• المستدمية النزلية	
• Pneumococcal Conjugate (PCV)*	• البكتيريا العقدية الرئوية*	
• Rota**	• فيروس الروتا**	
• IPV	• شلل أطفال معطل	عمر ٤ شهور 4 months
• DTaP	• الثلاثي البكتيري	
• Hepatitis B	• الالتهاب الكبدي (ب)	
• Hib	• المستدمية النزلية	
• Pneumococcal Conjugate (PCV)*	• البكتيريا العقدية الرئوية*	
• Rota**	• فيروس الروتا**	
• OPV	• شلل الأطفال الفموي	عمر ٦ شهور 6 months
• IPV	• شلل أطفال معطل	
• DTaP	• الثلاثي البكتيري	
• Hepatitis B	• الالتهاب الكبدي (ب)	
• Hib	• المستدمية النزلية	
• Pneumococcal Conjugate (PCV)*	• البكتيريا العقدية الرئوية*	

- Implement **universal infant immunization** using one of the recommended immunization schedules.

5- Environmental Exposures to Carcinogens

- **Stop using** all forms of **asbestos**.
- Provide safe drinking water.
- **Reduce** the **use of biomass and coal for heating** and cooking at home, and promote use of clean burning and efficient stoves.
- Implement food safety systems (legislation and monitoring) focusing on key contaminants eg. SFDA.

6- Occupational Exposures to Carcinogens

- Develop regulatory standards and enforce control of the use of known carcinogens in the workplace.
- **Include occupational cancer** in the national list of occupational diseases.
- Identify workers, workplaces and worksites with exposure to carcinogens.

Factors Affecting Cancer Control and Future Research

Factors Affecting Cancer Control

The following are important factors and trends affecting cancer control and the directions of future research

7- Radiation

- **Provide information** about sources and effects of all types of radiation.
- Establish **national radiation protection standards** (using internationally available guidelines).
- Ensure **regular safety training** of radiation workers.
- Promote UV risk awareness and UV protection action.
- For example Dose limits for Ionizing radiation are:
  - for the public, 1 mSv/year.
  - for occupationally exposed persons, 20 mSv/year.

How are people exposed to UV radiation?

- **Sunlight**: the main source of UV radiation.
- **Sunlamps and sunbeds** (tanning beds and booths).
- **Phototherapy** (UV therapy):
  - UVA (320 to 400 nm) OR UVB, UVB is divided into:
    → Broadband (280 to 320 nm) more carcinogenic
    → Narrowband (311-313 nm)
  - The carcinogenic potential of narrow band UVB is less established.
- **Other:** (Black-light lamps, Mercury-vapor lamps, High-pressure xenon and xenon-mercury arc lamps, plasma torches, and welding arcs).

Display of background radiation in a hotel at Naraha, Japan, showing dose rate in microsieverts per hour, five years after the Fukushima disaster.

Personal radiation badge

Radiation protection clothes

Quiz

MCQ

1- -A 55 years old male who has been working in the shoe cutting industry for the past 10 years. Which of the following conditions he is most prone to:
A- Mesothelioma
B- Dermatitis
C- Bladder cancer
D- Brain cancer

2- Which of the following cancers is most likely to occur among nickel manufacturing workers?
A- Lung and nasal
B- Blood and esophagus
C- Colon and rectal
D- Bladder and urethra

3- The most common cancer among men worldwide is
A- Lung
B- Colorectal
C- Prostate
D- Testicular

4- What is the primary prevention of cervical cancer?
A- Treatment of STDs
B- Pap smear every 3 years
C- Chemoprevention (vaccination)
D- Hysterectomy

5- Which type of cancer is associated with Diethylstilbestrol (DES) hormone?
A- Vaginal adenocarcinoma
B- Cervical cancer
C- Bladder cancer
D- Ovarian cancer

Answers

Q1	Q2	Q3	Q4	Q5
C	A	A	C	A

Thank You and Good Luck

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