

NCD Media Training on Cancer

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NCDAK MEDIA TRAINING SESSION

CANCER

TODAY TALK

- Globocan data 2018
- Risk factors
- Treatment and care
- Prevention

Figure 2. 1: Projected trends of cancer and other disease entities to 2030
 (Source: Kenya Health Policy 2014-2030)

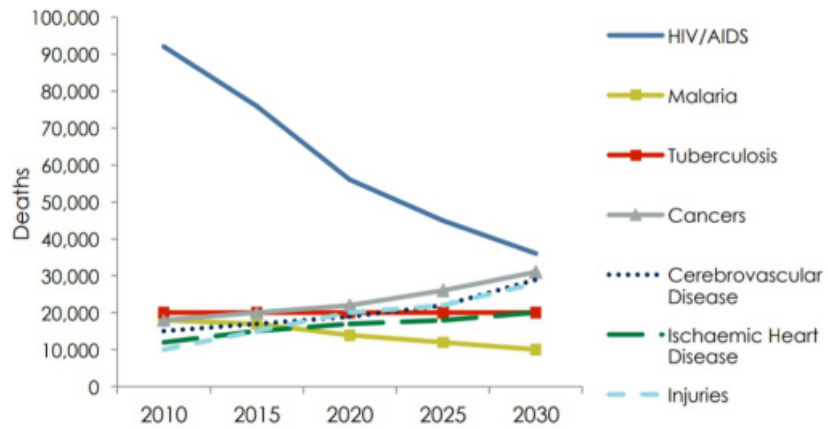
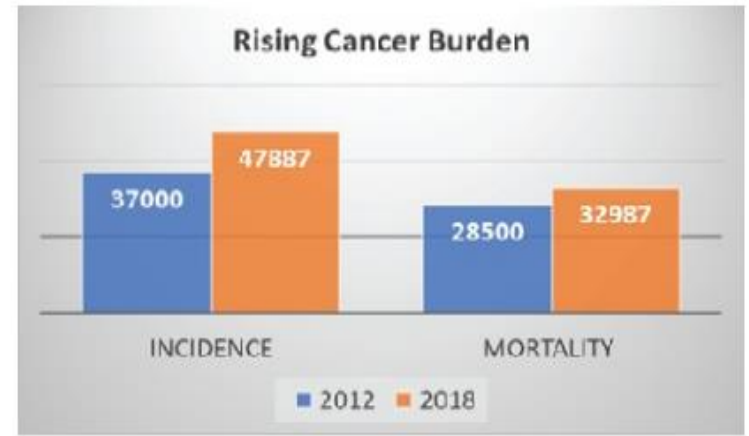
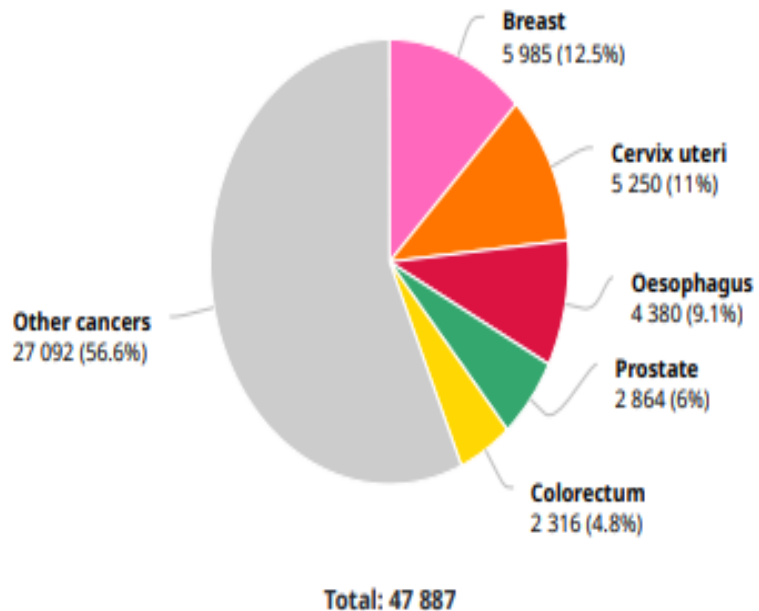


Figure 2. 2: Comparison of number of new cancer cases and cancer deaths between 2012 and 2018
 (Source: GLOBOCAN 2012 and 2018)



Number of new cases in 2018, both sexes, all ages



Total population

50 950 877

Number of new cases

47 887

70%

Number of deaths

32 987

Incidence, Mortality and Prevalence by cancer site

Cancer	New cases				Deaths				5-year prevalence (all ages)	
	Number	Rank	(%)	Cum.risk	Number	Rank	(%)	Cum.risk	Number	Prop.
Breast	5 985	1	12.5	4.54	2 553	3	7.7	2.01	13 246	51.68
Cervix uteri	5 250	2	11.0	3.73	3 286	2	10.0	2.64	10 963	42.78
Oesophagus	4 380	3	9.1	2.23	4 351	1	13.2	2.23	4 184	8.21
Prostate	2 864	4	6.0	3.69	1 663	5	5.0	1.73	4 750	18.76
Stomach	2 127	5	4.4	1.15	2 068	4	6.3	1.13	2 713	5.32
Non-Hodgkin lymphoma	1 952	6	4.1	0.57	1 209	8	3.7	0.42	4 119	8.08
Kaposi sarcoma	1 782	7	3.7	0.38	930	10	2.8	0.20	3 803	7.46
Leukaemia	1 699	8	3.5	0.45	1 311	7	4.0	0.41	3 845	7.55
Colon	1 354	9	2.8	0.66	937	9	2.8	0.46	2 350	4.61
Liver	1 346	10	2.8	0.65	1 331	6	4.0	0.65	1 190	2.34
Nasopharynx	1 103	11	2.3	0.34	732	13	2.2	0.28	2 614	5.13
Lip, oral cavity	1 032	12	2.2	0.52	805	11	2.4	0.44	2 121	4.16
Ovary	971	13	2.0	0.78	765	12	2.3	0.71	1 918	7.48
Rectum	849	14	1.8	0.42	458	18	1.4	0.23	1 567	3.08
Pancreas	735	15	1.5	0.38	719	14	2.2	0.37	536	1.05
Brain, nervous system	675	16	1.4	0.24	582	16	1.8	0.23	1 352	2.65
Lung	673	17	1.4	0.38	659	15	2.0	0.38	695	1.36
Multiple myeloma	607	18	1.3	0.29	501	17	1.5	0.25	1 051	2.06
Corpus uteri	604	19	1.3	0.67	322	20	0.98	0.38	1 438	5.61
Bladder	568	20	1.2	0.30	335	19	1.0	0.18	1 143	2.24
Thyroid	503	21	1.1	0.22	121	26	0.37	0.07	1 253	2.46
Gallbladder	426	22	0.89	0.27	279	22	0.85	0.18	500	0.98

Why cancer is a growing problem in Kenya/ Developing world:

- Poor diagnostic – most cancers diagnosed at **stage IV**
- Lack of treatment options (too expensive/ inaccessible)
- Poor management (follow up)
- Lack of proper knowledge...e.g. cancer as a disease!



**Cancer is
Not witchcraft!**

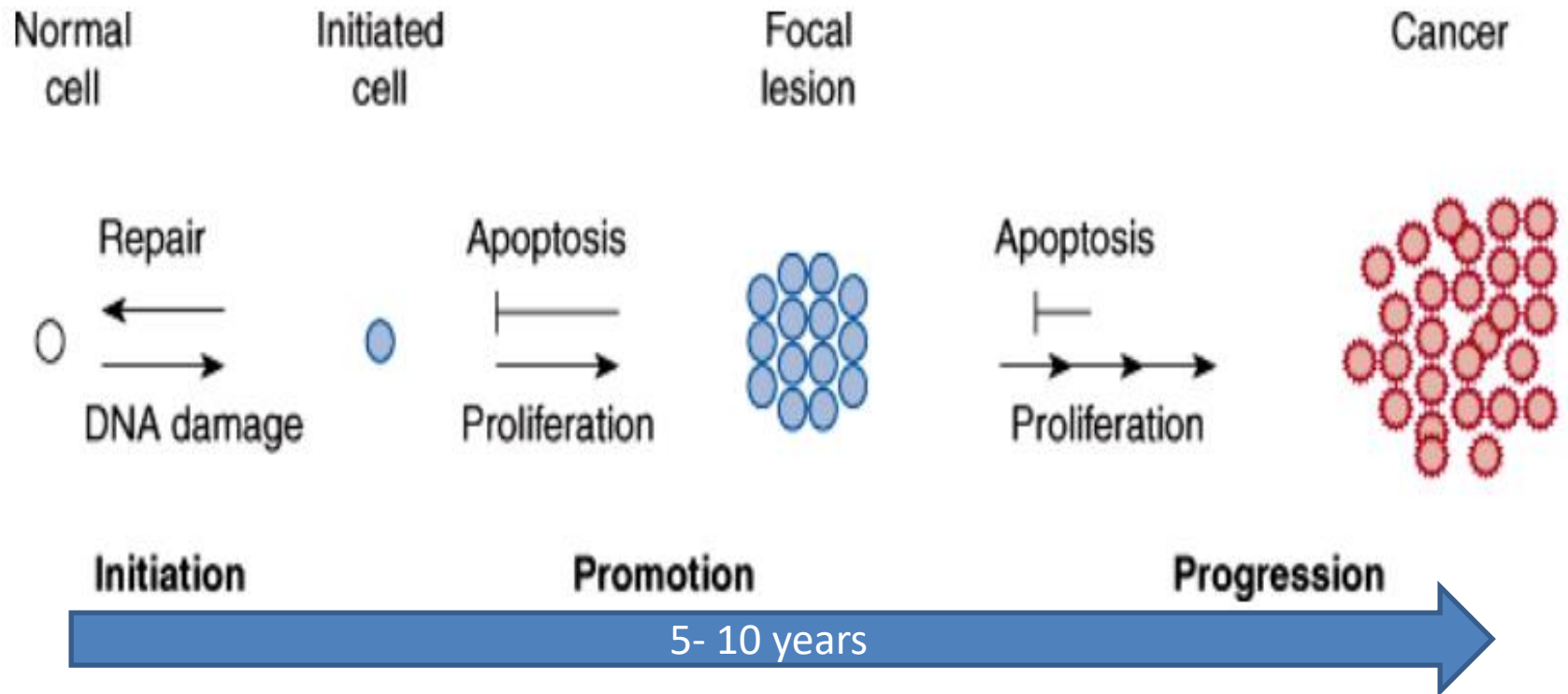
Table 2. 2: Status of Human Resources for Cancer in Kenya

Cadre	Number	No./target population*	Recommended number
Medical Oncologists	16	0.033/100,000 population	1.8/100,000 population (ASCO)**
Oncology pharmacists	9		
Radiation/Clinical Oncologists	17	0.036/100,000 population	1/100,000 population (IAEA)***
Pediatric oncologists	4		

Gynecological Oncologists	9		
Surgical oncologists	10		
Hemato-oncologists	5	0.104/1,000,000 pop	5 hematologists/1,000,000 pop (ASH)****
Oncology clinical officers	34		
Oncology nurses	35	0.404/1000 patients	3/1000 patients (IAEA)
Medical physicists	10	0.12/1000 patients	3/1000 patients (IAEA)
Therapy radiographers/ Radiotherapy Technologists (RTTs)	27	0.31/1000 patients	7/1000 patients (IAEA)
Nuclear medicine physician	3		
Nuclear medicine technologists	3		
Palliative care physicians	3		
Palliative care nurses	328		

Development of cancer

Cancer is a multi-step process



Borrowed from: **Chemical Carcinogenesis** by James E. Klaunig

Carcinogenic dietary components common in Kenya

1. High carbohydrate load (Staples) and soft drinks

-Elevates blood glucose, insulin and insulin-like growth factor 1



Ugali



Chapati



Wali



Matoke



Beans



soft drinks



chai

- Tumor cells - thrive under high **glucose**
- **Glucose**, Insulin and growth factors favor prolonged tumor survival

NB: Gluten – Has been associated with intestinal cancer, BUT even then, gluten only increases risk if a person has **celiac disease**, or true gluten intolerance.

2. Meats

- Kenya staple are usually served with various meats and/or vegetables.
- Meat is either stewed or roasted

MECHANISM OF CARCINOGENESIS

- **High-temperature cooking** methods generate compounds that contribute to carcinogenic risk!
 - Charred meat¹ (HCAs and PAHs)
 - e.g. in **“nyama choma”**
 - Highly processed meat¹
 - Red /organ meat^{2A}
- HCAs: heterocyclic amines
PAHs: polycyclic aromatic hydrocarbons;



“nyama choma” or **Nyam chom**

Popular chomas

- Beef
- Goat
- Chicken

3. Reused frying oil

Deep fried foods are becoming increasingly common in Kenya with French fries, wheat products as mandazi and doughnuts, chicken and fish.

To cut costs: vendors recycle the cooking fats/oils used in the deep frying process over and over

Repeated high temperature heating - carcinogenic substances which accumulation with every re-use

These includes:

- PAHs (e.g. B[a]P)¹
- Acrylamide^{2A}
- Acrolein³



Mandazi

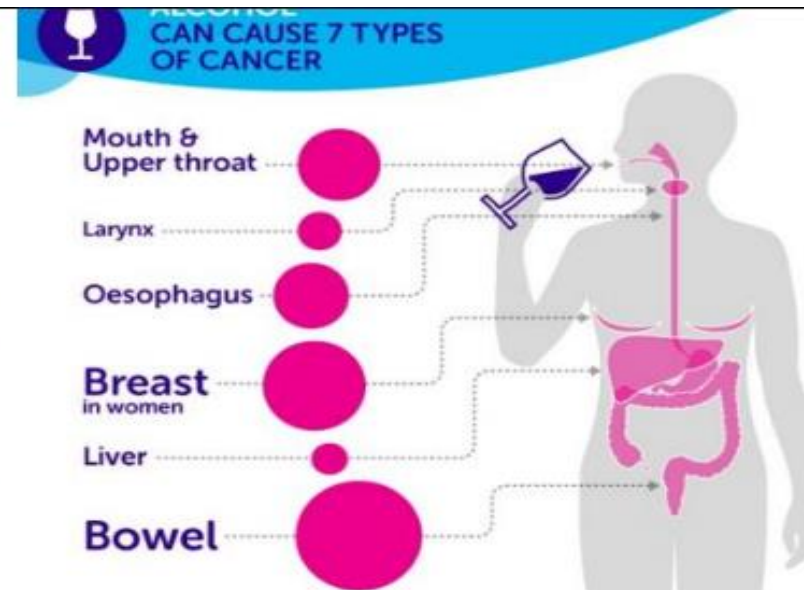
4. Alcohol consumption

MECHANISM OF PATHOGENESIS:

Alcohol (**Ethanol**¹) is metabolized by the enzyme called alcohol dehydrogenase (**ADH**) to **acetaldehyde**¹.

- Acetaldehyde causes DNA mutations
- Further, acetaldehyde results in the damage of the antioxidative defense system (**AODS**).

NB: Alcohol is the same whether in wine, beer or spirits (**CH₃CH₂OH**)



Local brew

- Many impurities
- Intentionally adulterated e.g Kumi kumi

March 1, 2018

8. Salt

□ MECHANISM OF CARCINOGENESIS

1. Salt strongly enhances gastritis
2. Salt also facilitates colonization of *H. pylori*

- The above are both risk factors for gastric carcinogenesis [[65](#), [87](#), [99](#)] as they lead to intestinal metaplasia, dysplasia, early gastric cancer and eventually advanced gastric cancer [[180](#)].



March 1, 2018



9. Antibiotics

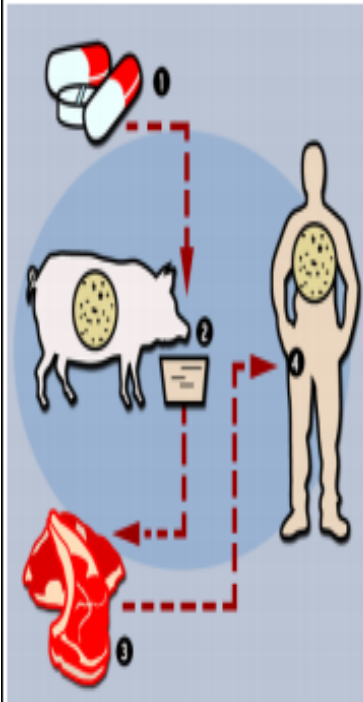
Agricultural sources (Growth promotion, Disease prevention, Sick animal treatment)

- **MECHANISM OF CARCINOGENESIS:**

- <https://www.nature.com/news/scientists-bust-myth-that-our-bodies-have-more-bacteria-than-human-cells-1.19136>

Causes **Dysbiosis** - microbial imbalance on or inside the body.

- Microbiota and host form a complex '**super-organism**'
- The microbiome is often termed as the "forgotten organ"
- Altered microbiome may promote resistance to cell death — one of the hallmarks of cancers — and may trigger cancer-promoting inflammation.
- Altered microbiota may release of carcinogenic molecules;
 - genotoxins,
 - tumour-promoting metabolites.



10. Aflatoxins¹

Due to poor storage of cereals (maize and wheat)

Fungal toxin



- Most of the research was in the 70's and 80's [109].
- Known risk factor for the development of Hepatocellular carcinoma (HCC)
- MECHANISM CARCINOGENESIS:
 - Aflatoxin causes DNA modification (mutation)
- Aflatoxin contamination could occur indirectly through consumption of animal products such as milk, blood and meat [63].
- In Kenya maize, wheat, rice are dietary staples and major sources of animal feed.
- Complicated by climate change (plant-harvest cycles)

11. Fermented /sour milk

- This is prepared through a fermentation process which yields alcohol and acetaldehyde
- The protocol for the production of **mursik** includes the addition of soot from burnt wood for purposes of flavor and as a preservative [118].
- CARCINOGENICITY:

-Ethanol¹

-Acetaldehyde¹

-Soot¹ (in mursik)

-Cholesterol³



Mursik

Environmental carcinogenesis (Kenya)



Asbestos roof

Aging - carcinogenic
potential is
exacerbated



Jua kali artisans

no sun block
no sun glasses



Snuff container

Filter or no
filter don't
matter

Poor waste management and disposal

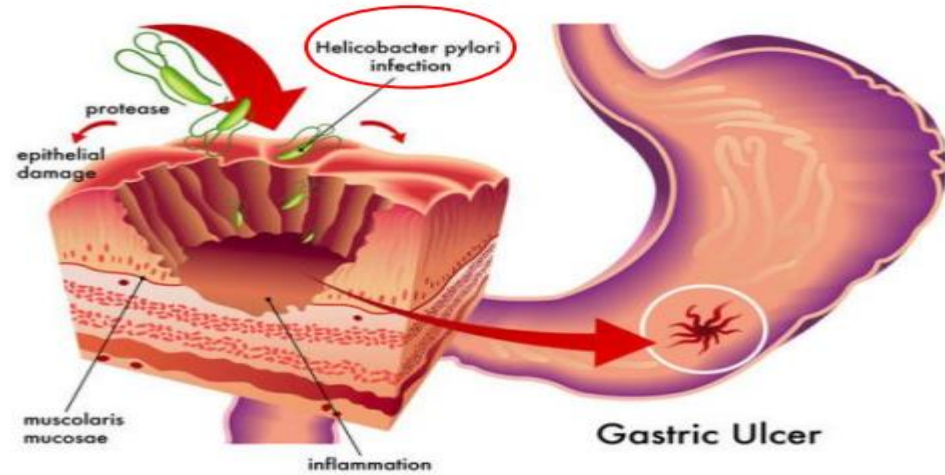
- E.g. In Nairobi Kenya - the emergence of one of Africa's largest open dumpsites, the Nairobi's Dandora dump site
- Soil analysis: **lead (Pb)**, mercury (Hg), cadmium (Cd), copper (Cu), zinc (Zn), **arsenic (As)**, silver (Ag), iron (Fe), and chromium (Cr)
- Human exposure - derives from drinking water, air and food
- **Arsenic (As)** is a group 1 carcinogen while **lead is group 2A**
- Decomposition leads - volatile organic compounds (VOCs) e.g. **formaldehyde**¹[164].



Infectious agents and cancer



Hepatitis B virus



HPV AND CERVICAL CANCER

Untreated parasitic infections

- E.g. Schistosomiasis or bilharzias
- one of the so called “neglected tropical diseases”

serious and irreversible lesions in the urogenital tract - may eventually lead to squamous cell carcinoma of the bladder

Bladder cancer



HEREDITARY/GENETIC 5%

- On Feb 16, 2013 Jolie underwent double mastectomy
- Family tree warranted genetic testing for BRCA mutation
- Found out 87% of risk in developing cancer
- Mastectomy lowered this risk to under 5%

ANGELINA JOLIE PITT

2 years ago, actress and director JOLIE PITT wrote about her choice to have a preventive double mastectomy. A simple blood test had revealed that she carries a mutation in the BRCA1 gene.

Source: New York Times

Graphic nuviun.com

**87% Risk for her to develop
Breast Cancer**

"My doctors estimated that I had an **87 % risk** of breast cancer...

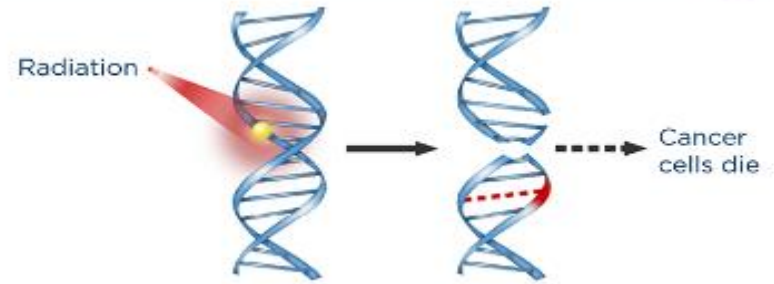
**50% Risk for her to develop
Ovarian Cancer**

... and a **50 % risk** of ovarian cancer,

... although the risk is different in the case of each woman."

0% 20% 40% 60% 80% 100%

RADIOTHERAPY



After Treatment



Multiple treatment
1 to 35

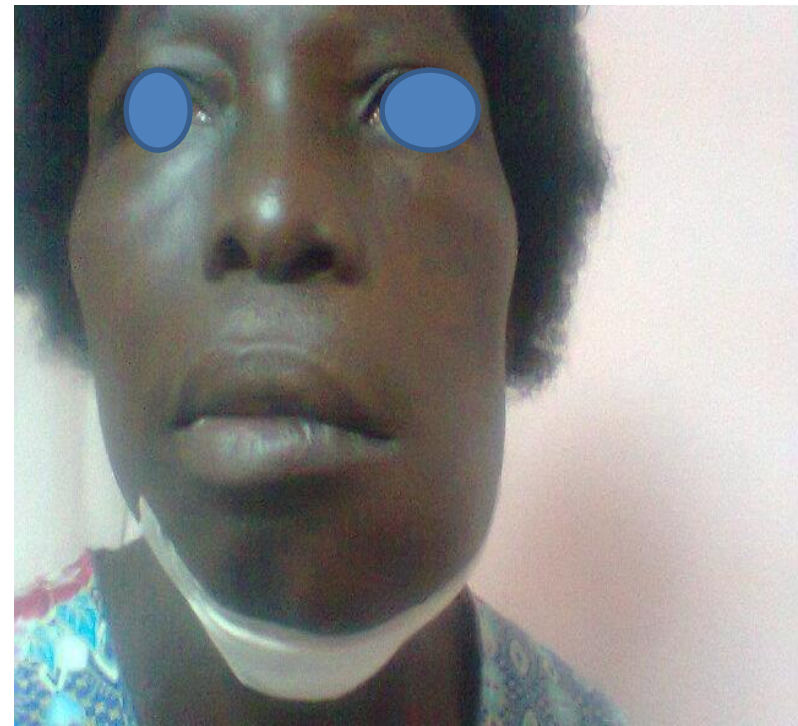


Comprehensive Cancer Facility	Ownership	Number of Radiotherapy machines	Number of Brachytherapy machines	Deficit
Kenyatta National Hospital	Public	3	1	1 LINAC; 1 brachytherapy machine
Kenyatta University Hospital	Public	1	0	1LINAC, 2 brachytherapy machines
Moi Teaching and Referral Hospital	Public	0 (Delivery ongoing)	0(Delivery ongoing)	-
Aga Khan University Hospital	Private	2	1	
The Nairobi Hospital	Private	2	1	
Cancer Care Kenya-HCG	Private	2	0	
Texas Cancer Centre	Private	2	0	
Equira Cancer Centre, Eldoret	Private	1	1	
Nairobi West Hospital	Private	1	0	





CHEMOTHERAPY



CHEMOTHERAPY SIDE EFFECTS



- ↓ alopecia
- Capecitabine
 - Vinorelbine
 - Carboplatin



- ↓ neuropathy
- Capecitabine
 - Anthracyclines
 - Gemcitabine



- ↓ IVs
- Capecitabine

- ↓ GI symptoms
- Taxanes
 - Gemcitabine



- ↓ myelosuppression
- Taxanes
 - Capecitabine



Cost of treatment of cancer



1 in 5

new cancer cases is **breast cancer** of which 99% are from women



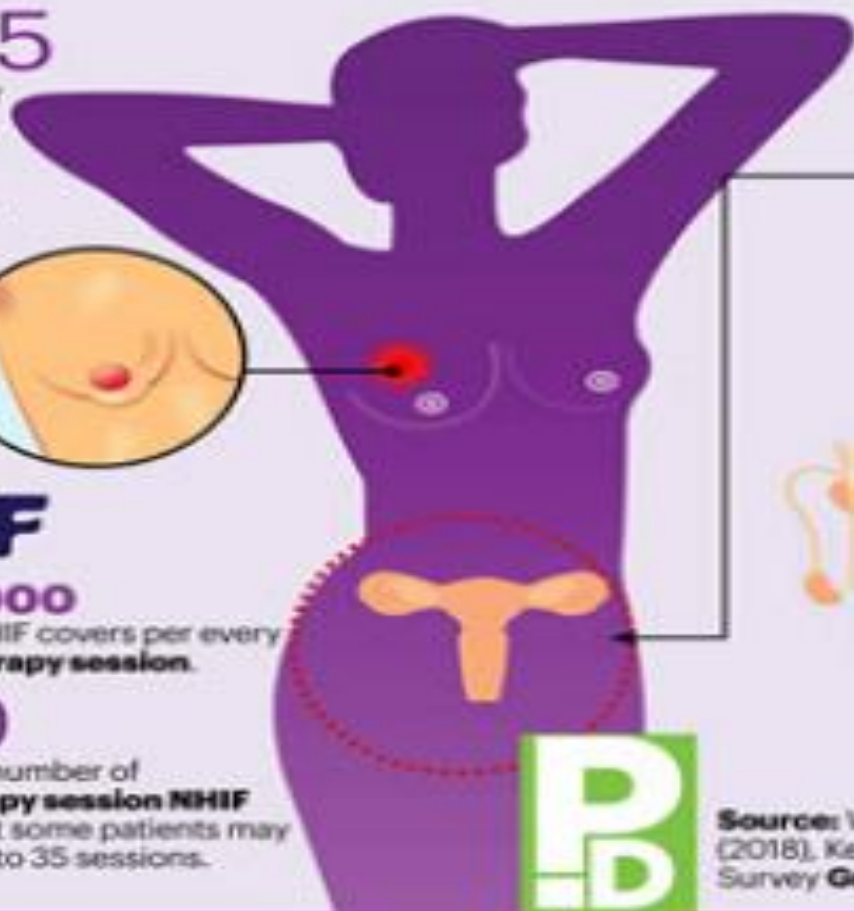
NHIF

Sh25,000

Amount NHIF covers per every **chemotherapy session**.

x20

Maximum number of **radiotherapy session NHIF covers**, but some patients may require up-to 35 sessions.



Sh300,000 – Sh500,000

Estimated cost for **breast reconstructive surgery** in Kenya.

Sh75,000 – Sh300,000

Estimated cost for **chemotherapy cycle for breast cancer** with the patients requiring at-least 6.

Sh2,000 – Sh5,000

Estimated cost for **breast prosthesis (cancer aftercare)** in Kenya.

Sh18,138 – Sh54,839

Estimated cost for **Cervical cancer diagnostic** procedures for in Kenya in a public and private hospitals respectively.

Sh1,000 Sh2,000

Estimated cost for **blood count test** done before every chemotherapy session



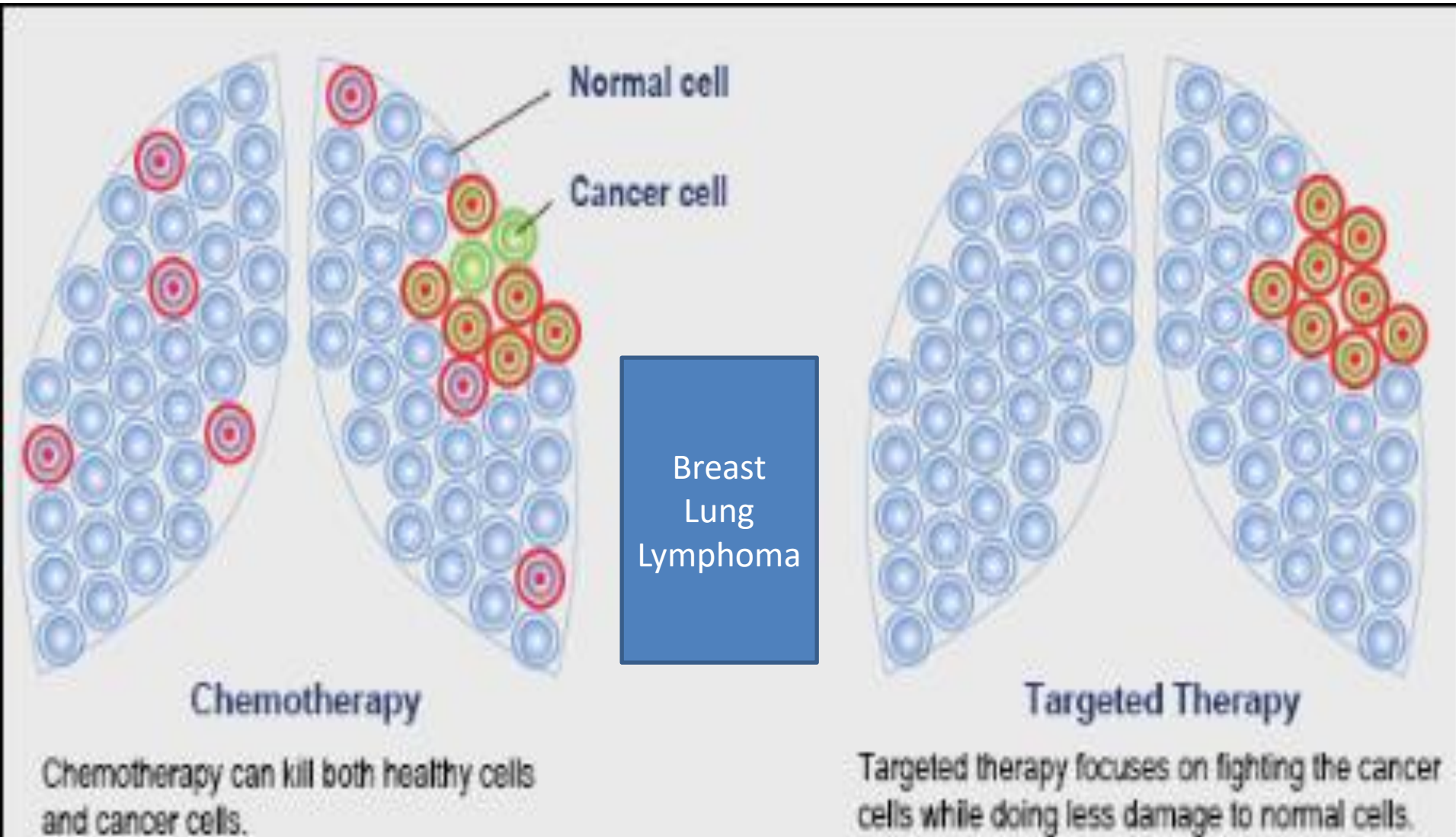
3%

Estimatedly had been tested for **prostate cancer** in the country (Kenya Demographic and Health Survey)

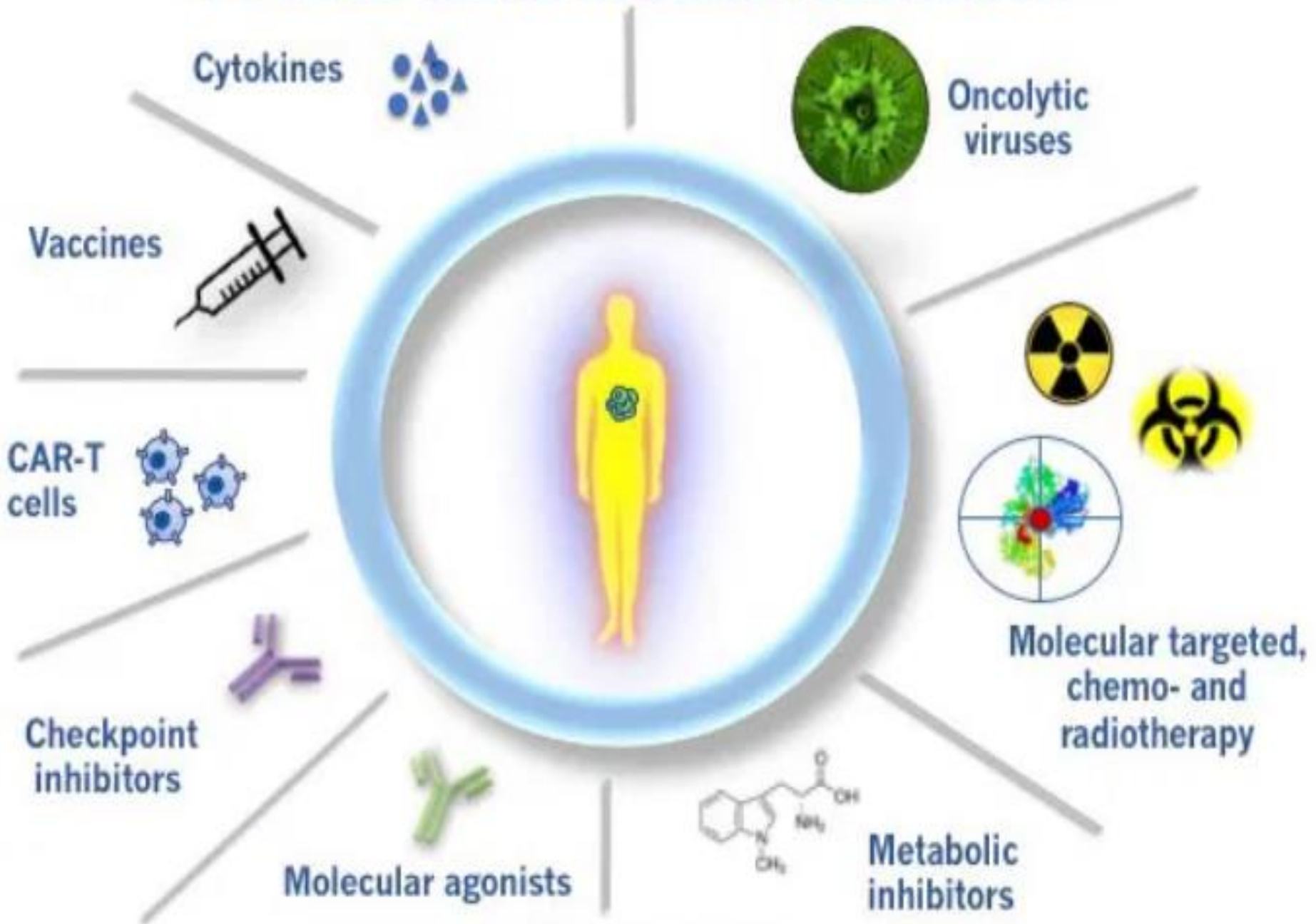


Source: WHO, Peer Review Journal (2018), Kenya Demographic and Health Survey **Graphic: Michael Mosota**

Targeted therapy



TYPES OF CANCER IMMUNOTHERAPY



PREVENTION

Organization of Cancer Health Service Delivery

Level of Care	Scope of Services
Level 1 (Community)	Health Promotion; Education and Awareness Creation on symptom recognition; Prevention, Palliative Care
Level 2 (Dispensaries)	Health Promotion; Education and Awareness; Screening for breast and cervical cancer; Early detection; Palliative care
Level 3 (Health Centres)	Health Promotion; Screening for Breast, Cervical, Oral and Colorectal Cancer; Early detection; Palliative care
Level 4 (Sub county Referral/Primary Referral facilities)	Health Promotion; Screening for Breast, Cervical, Oral and Colorectal Cancers; Early detection; Treatment (Surgical, Supportive); Palliative care
Level 5 (County Referral/Secondary Referral facilities)	Health Promotion; Screening; Early detection; Treatment (Surgical, *Chemotherapy in ten regional cancer centres, *Radiotherapy in 4 of the ten regional cancer centres by 2022, Supportive); Palliative care
Level 6 (Tertiary Referral facilities)	KNH, MTRH, KUTRRH as National Centres of excellence (Hubs for the regional cancer centres)



Discover. Care. Believe.

10 CANCER PREVENTION TIPS



- 1 Stop, or Never Start, Smoking**
 Smoking is the number one cause of lung cancer, and the habit contributes to cancers of the esophagus, larynx, mouth, throat, and more.
- 2 Exercise**
 Physical activity – even moderate exercise – can reduce the risk not only of developing cancer but of having a recurrence following treatment.
- 3 Moderate Alcohol Consumption**
 Alcohol use is linked not just to liver cancer, but to a number of other types, including head and neck, esophageal, breast, and colorectal.
- 4 Know Your Family History**
 If there is a strong history of cancer in your family, talk with your physician about genetic counseling.
- 5 Wear Sunscreen**
 Throughout the year, sunscreen is an important first line of protection against sun exposure, which can cause skin cancer.
- 6 Get Immunized**
 The human papillomavirus and hepatitis B virus vaccines can help prevent cervical and liver cancer, respectively, as well as other forms of cancer.
- 7 Practice Safe Sex**
 Safe sex makes you less likely to contract a sexually transmitted infection like HPV or HIV, which increases the risk of other cancers.
- 8 Get Regular Check-Ups**
 Make regular appointments with your primary care physician to keep track of any changes in your body.
- 9 Limit Consumption of Red Meats**
 Research shows red meat has been linked to an increased risk for colorectal, pancreatic, and prostate cancers.
- 10 Maintain a Healthy Weight**
 There is strong evidence that weight gain, being overweight, and obesity increases the risk of 11 cancers, including breast and pancreatic.

Sources: World Cancer Research Fund International



THANK YOU