Breast Cancer in Women

Challenge #2: How can we use modern health information to improve women's health?

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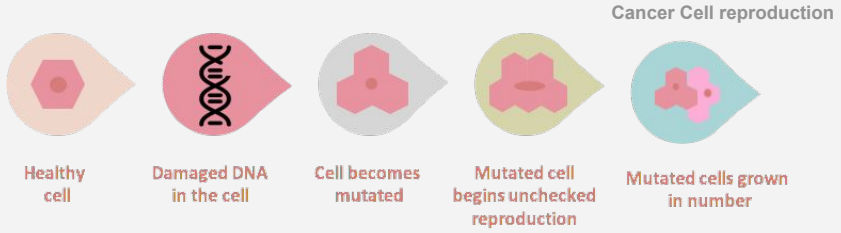
Breast cancer in women (U.S.A)

Introduction

Breast cancer is the most common cancer in women worldwide, nearly 1.7 million new cases were diagnosed in 2012 according to International Agency for Research on Cancer. Breast cancer is now the leading cause of cancer-related deaths in women in the world's developing regions. Even the majority of new breast cancer diagnoses and deaths occur in countries in developing, the rate of breast cancer per 100,000 women is higher in the United State of America (U.S.A), Canada and Europe. Cancer is the second leading cause of death in the United States, exceeded only by heart disease.

What is the breast cancer? And Why it happens?

The breast cancer is a group of diseases cells that change and spread out of control. Cancer begins in the cells which are forming the tissues. Sometimes the process of growing or the cell division goes wrong and new cells are formed when the body doesn't need them or some damaged or old cells don't die when they should. When this happens the body forms mass of tissue called tumors. Breast cancer occurs when tumors becomes malignant in the breast.



Hypothesis

1. Obesity increases the risk for breast cancer mortality in women.
2. Having a lower income has an effect on the breast cancer mortality in women (health insurance and periodical revisions).

Biological questions

1.- Are there differences in the Rate of breast cancer mortality in women in these risk factor groups? (slide 3)

2.- Is there a relation between the income and the breast cancer mortality in women? (slide 4)

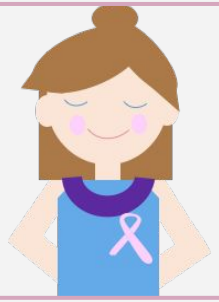
2.- Is there a relation between the income and the breast cancer mortality in women? (slide 5)

Scope of analysis

1. Location: United State of America (U.S.A) together and as independents States.
2. Period: 2010-2015
3. Variables: The age, the ethnicities, the obesity, the income and the rate breast cancer mortality.

Breast cancer in women (U.S.A)

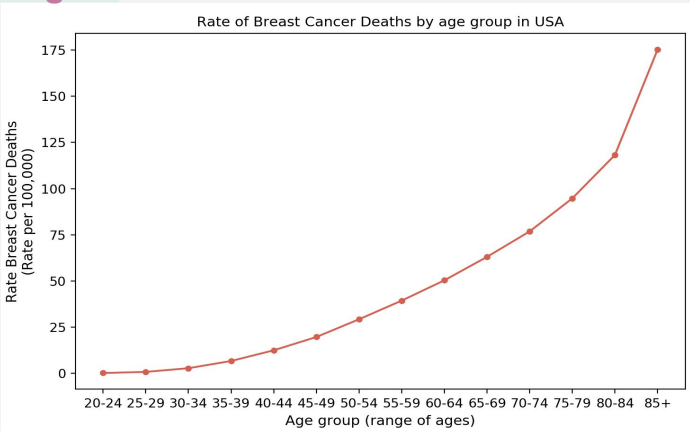
Risk factors that cannot be changed



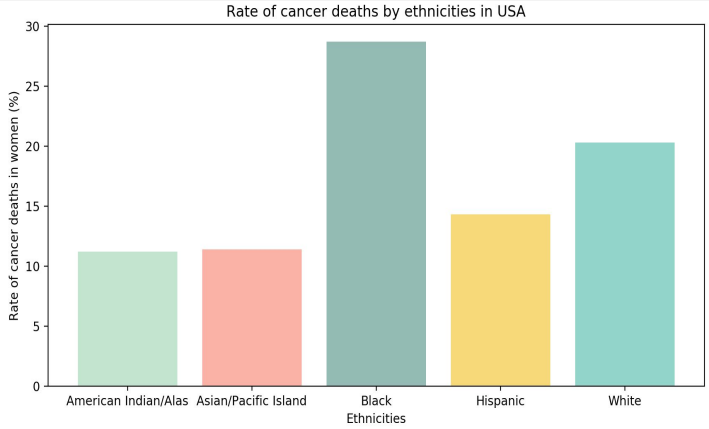
- AGE
- GENDER
- ETHNICITIES
- FAMILY HISTORY
- PERSONAL HEALTH
- EARLY MENSTRUATION
- LATE MENOPAUSE

- Are there differences in the rate of breast cancer mortality in women these risk factor groups?

Age



Ethnicities

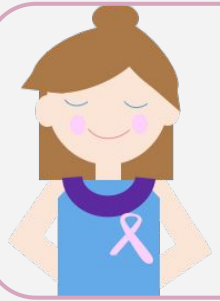


On the right, the breast cancer Death by ethnicities in USA. Even that it's diagnosed more often in white women (Data not shown publication: *Howlader et. al. 2012*). The mortality is higher in black women as shows the graph. Some authors (*Daly et al. 2015*) point that the black women continue to die disproportionately from aggressive forms of breast cancer.

Both graphs shows the breast cancer mortality in women in a period from 200-2015.
On the left, the graph shows the rate of breast cancer mortality by age group (range of ages).

Breast cancer in women (by State at U.S.A)

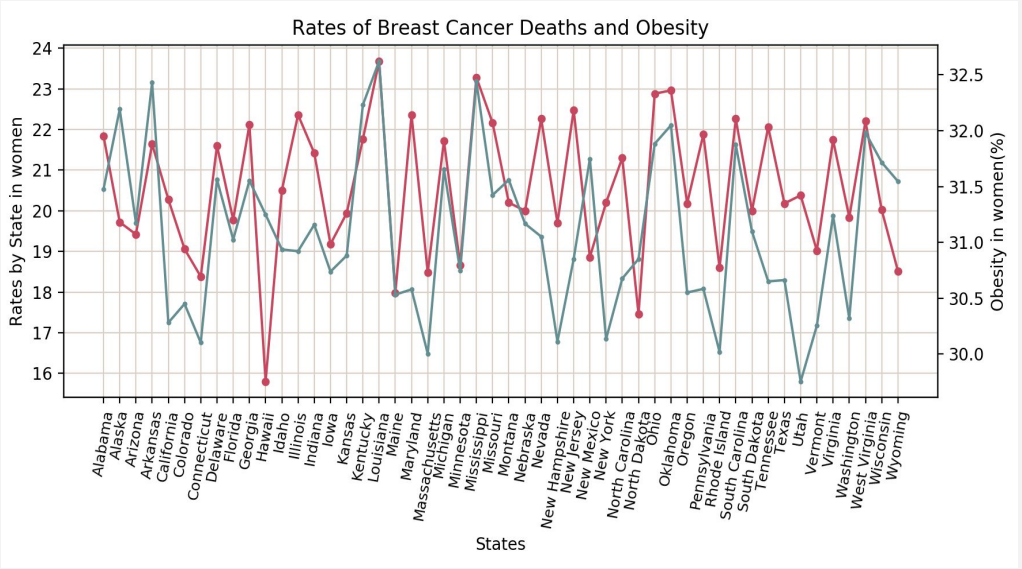
Risk factors that can be changed



- OBESITY
- LACK OF PHYSICAL ACTIVITY
- POOR DIET
- DRINKING ALCOHOL
- RADIATION CHEST
- HORMONE REPLACEMENT THERAPY (HRT)

Font : Wikipedia :By Gigillo83, original of 70.29.208.129 - w:en:Wikipedia

- Is there a relation between obesity and the breast cancer mortality (U.S.A)?



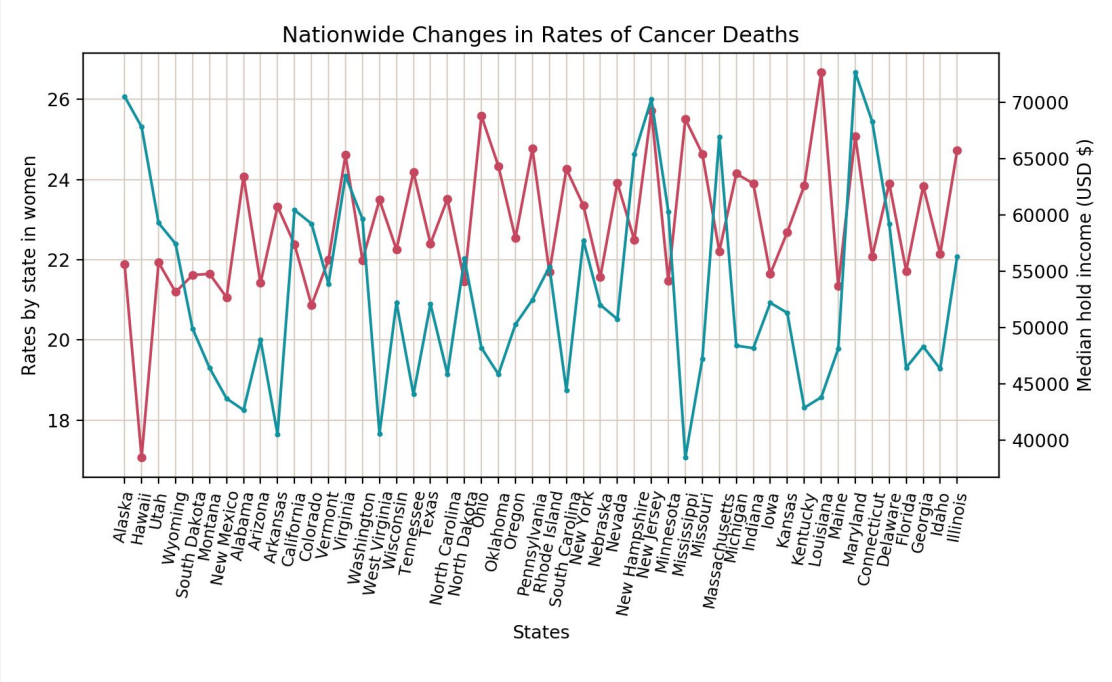
On the left, a map of United States of America. **On the right,** this graph shows the **rate of breast cancer** in women (with a 95% of confidence intervals) represented in red line and green line represents the % of women's obesity. Both cases were plotted by state including women with all ages and ethnicities. In this graph we can observed that in the majority of the states the % increases or decreases similarly with the % of breast cancer mortality. Besides the analysis of the available dataset, we have not enough information of other possible factors to find a robust and direct relation between the obesity and breast cancer mortality by states. But the tendency is similar.4

Breast cancer in women (by State at U.S.A)

- Is there a relation between the income and the Breast Cancer mortality in women at USA?

This graph shows the **rate of breast cancer** in women (with a 95% of confidence intervals) represented in red line and blue-green line represents the Median hold income (U.S.D $). Both cases were plotted by state including women with all ages and ethnicities. In this graph we can observed a tendency of negative correlation, where in the majority of the states when the Median income decrease, the mortality by breast cancer increase.
Besides it is temptative to do this affirmation we need more data and analysis to confirm that a higher income implies less mortality.

(This is founded by the fact medical accessibility)



Breast cancer in women

Summary and conclusions

It is important to note that any affirmation requires a more deep research, overall in an important topic like cancer.

- Genetic factors like age and ethnicity have an important role in the prevalence against breast cancer mortality.
- Social and environmental factors like obesity or medical service accessibility might be related to breast cancer mortality.

Newer datasets and statistics are required to have a more confident outcome of this work.

Moreover a tentative prediction of breast cancer in U.S.A could be achieved with the use of machine learning models, which I am currently to bring this project one step forwards.

Breast cancer control

We could control the external factors like having a healthy diet, physical activity, alcohol consumption control, obesity among others. These could eventually have an impact in reducing the incidence of breast cancer in a long term.

After all these strategies cannot eliminate the majority of breast cancer. Therefore, early detection in order to improve its outcome and survival remains (Anderson et al., 2008).

Some recommendations from the World Health Organization to prevent breast cancer are:

- **Early diagnosis**
- **Mammography screening**
- **Breast self examination (BSE)**
- **Clinical Breast Examination (CBE)**

Bibliography and resources (In alphabetical order)

- **American cancer society;**Breast cancer; https://www.cancer.org/cancer/breast-cancer.html
- **International Agency for Research on Cancer;** Estimated Incidence, Mortality and Prevalence Worldwide in 2012; http://globocan.iarc.fr/Default.aspx
- **Median Household Income by State** (Note that table does not reflect the margin of error in the values). http://factfinder.census.gov/bkmk/table/1.0/en/ACS/11_1YR/R1901.US01PRF
- **National Cell Cancer**, *Title of Resource;* MM/DD/YY accessed; https://www.nationalbreastcancer.org/what-is-cancer
- **Nutrition, Physical Activity, and Obesity - Behavioral Risk Factor Surveillance System;** https://chronicdata.cdc.gov/Nutrition-Physical-Activity-and-Obesity/Nutrition-Physical-Activity-and-Obesity-Behavioral/hn4x-zwk7
- **States ranked by median household income median Household Income by State** (Note that table does not reflect the margin of error in the values): http://factfinder.census.gov/bkmk/table/1.0/en/ACS/11_1YR/R1901.US01PRF
- **United States Census Bureau;** Health Insurance Historical Tables; https://www.census.gov/data/tables/time-series/demo/health-insurance/historical-series/hic.html
- **U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool**, based on November 2017 submission data (1999-2015): **U.S. Department of Health and Human Services**, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, June 2018.
- **Wikipedia**; By Gigillo83, original of 70.29.208.129 - w:en:Wikipedia talk:Images for upload/svg/USA-states-blank-XMLcomments-SVGnameIDs-CSSfillCLASSes.svg, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=11099373

Scientific articles:

- Anderson BO et al. (2008). **Guideline implementation for breast healthcare in low-income and middle-income countries: overview of the Breast Health Global Initiative Global Summit 2007**. Cancer, 113, 2221–43.
- Bobby Daly, MD, MBA and Olufunmilayo I. Olopade, MBBS, FACP; **Race, Ethnicity, and the Diagnosis of Breast Cancer**; JAMA. 2015 Jan 13; 313(2): 141–142.
- Howlader N, Noone AM, Krapcho M, et. al. (eds). **SEER Cancer Statistics Review**, 1975–2009 (Vintage 2009 Populations), National Cancer Institute. Bethesda, MD, 2012. Retrieved September 7, 2012.

Tools used:

Python modules: Numpy, pandas and matplotlib. **I designed all the graphics and cartoons of this presentation without reference.**