# Descriptive Epidemiology

## Ovarian Cancer

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# What is Ovarian Cancer?

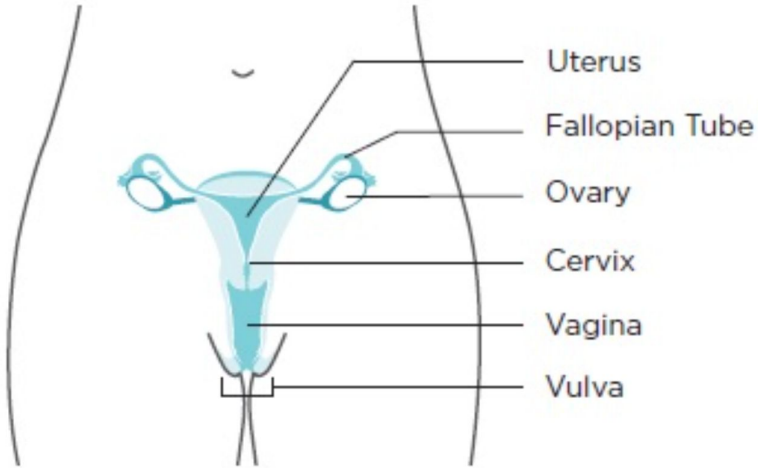
Ovarian cancer includes any type of cancer that originates in the ovaries, fallopian tubes, or peritoneum (body cavity lining) of the area.

70% of ovarian cancer cases are made of a high grade serous tumor.

Genetic mutations in genes BRCA1 and BRAC2 raise the risk of ovarian cancer.

Things associated with a decreased risk include

- 5+ years of birth control pills usage
- Tubal ligation or hysterectomy
- Giving birth
- Breastfeeding




(Centers for Disease Control and Prevention, 2021)

# Statistics

From the American Cancer Society Database:

- Of all cancer types, ovarian cancer has the fifth highest **rate of death**, at 6.3 per 100,000
- In 2018, 13,478 women **died** of ovarian cancer.
- **Incidence** of ovarian cancer in 2018 was 19,679 cases.
- A woman's **lifetime risk** of developing this cancer is 1 in 78.
- A woman's **probability** of developing and dying from cancer is 0.9%.

(American Cancer Society, 2018)

# SEER and the American Cancer Society

- SEER (Surveillance, Epidemiology, and End Results Program) is a source for cancer statistics within the U.S.
- SEER is an appropriate source for this assignment as it monitors the public's health, by reporting annually the burden of cancer - this data source also reports based on varying demographics and describes disease patterns
- The American Cancer Society reports cancer statistics, common risk factors, demographic trends, how to detect early signs, and treatment options - this source offers more broad information, but is helpful in understanding specific cancer diagnoses
- Gathering information from the American Cancer Society was helpful when generating a hypothesis, as common ways to prevent a specific cancer are listed as well as behaviors to lower the risk

# Host Characteristics

# Who can get ovarian cancer?

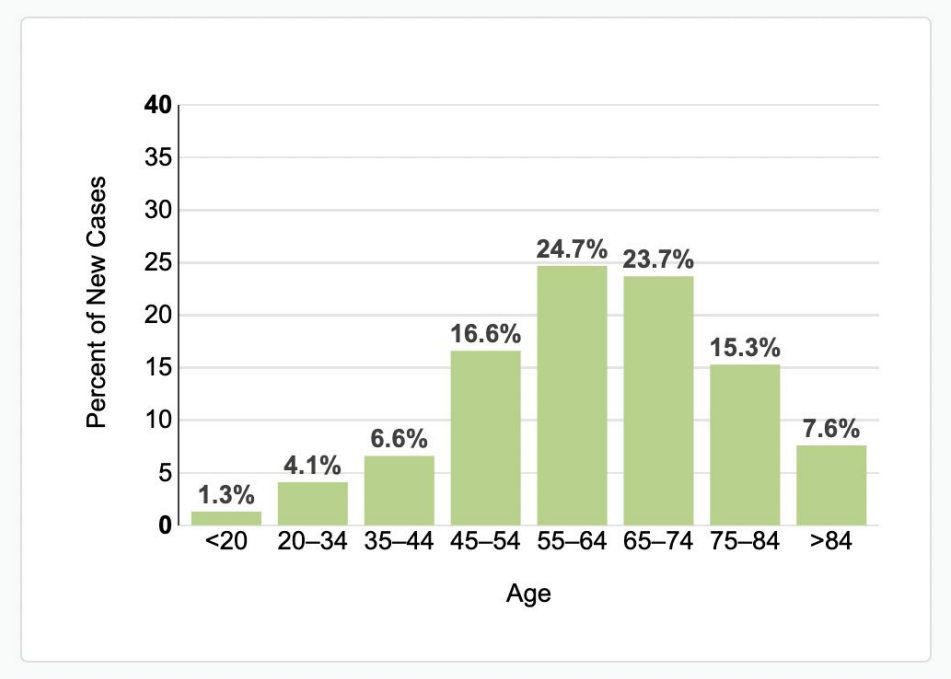
Ovarian cancer is sex-specifc, as its diagnosis is only possible with the presence of female reproductive organs

- Women of all races and ethnicities are affected by ovarian cancer, white women being more disproportionately affected; 11.3 white women per 100,000 persons were diagnosed with ovarian cancer between 2014-2018 - next was Hispanic women with 11.0 women diagnosed per 100,000 persons
- The most common age group diagnosed with ovarian cancer are women between 55-64 years-old, 63 being the median age of diagnosis (NIH, 2021).

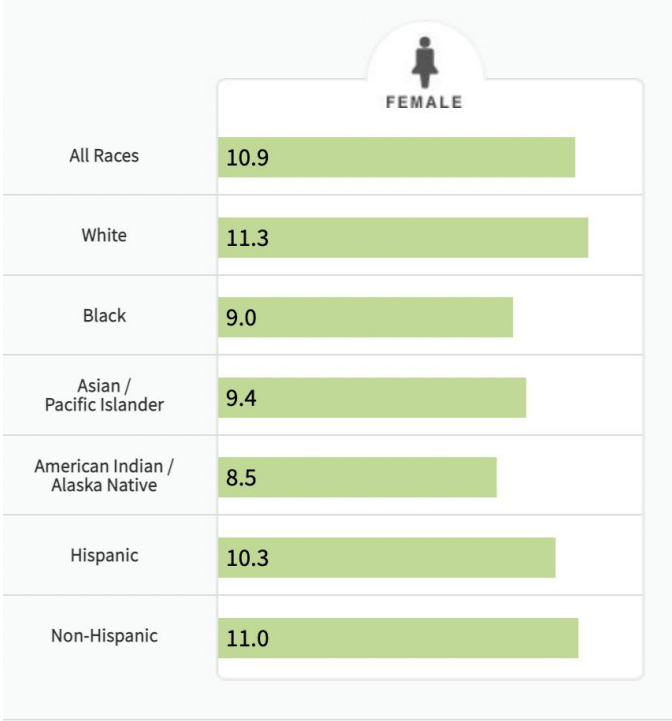
# What are the risk factors of ovarian cancer?

- Risk factors are primarily genetic, as women with a family history of ovarian cancer are typically viewed to have a higher risk of diagnosis
- Age also plays a factor in ovarian cancer, as it is rarely diagnosed in women below the age of 40 - a majority of women are diagnosed after menopause
- Women who never carried a pregnancy to full term or women who have their first full term pregnancy over the age of 35 (American Cancer Society, 2021).

# Trends across demographics




(SEER, 2019)

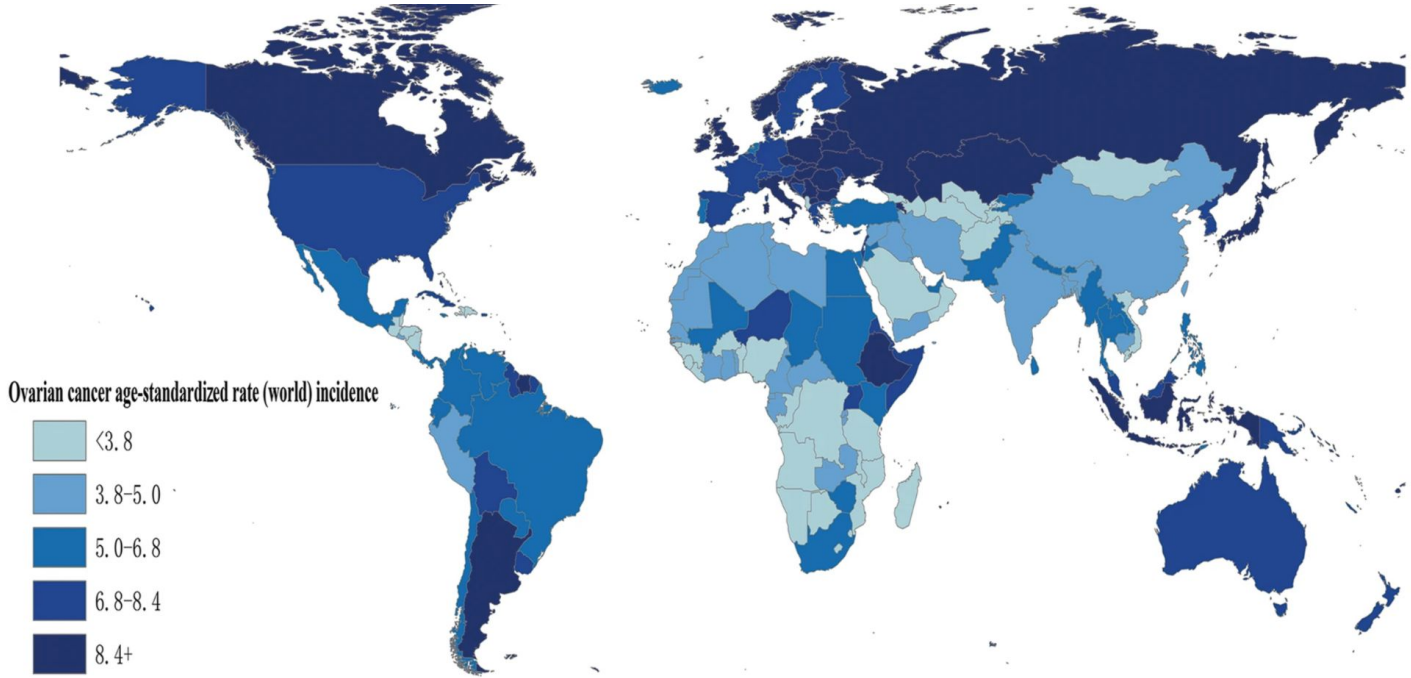



(SEER, 2019)

# Environmental Factors

# Global Trends

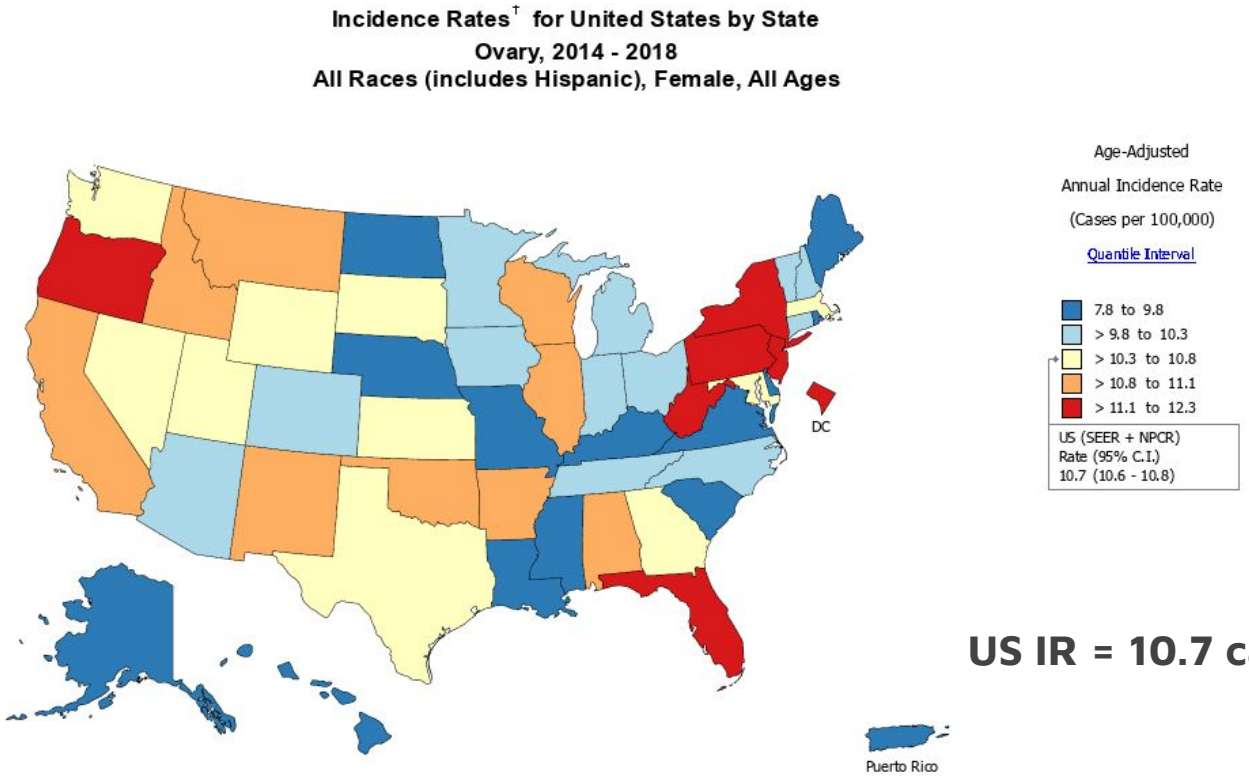
Approximately 9.2 per 100,000 women of ASR (age standardized rate) occurred in more developed regions and 5 per 100,000 women in less developed regions. The highest ASR was observed in Central and Eastern Europe, with 11.4 per 100,000 women, while the lowest ASR was observed in Micronesia, with 3.0 per 100,000 women




Cases per 100,000 women

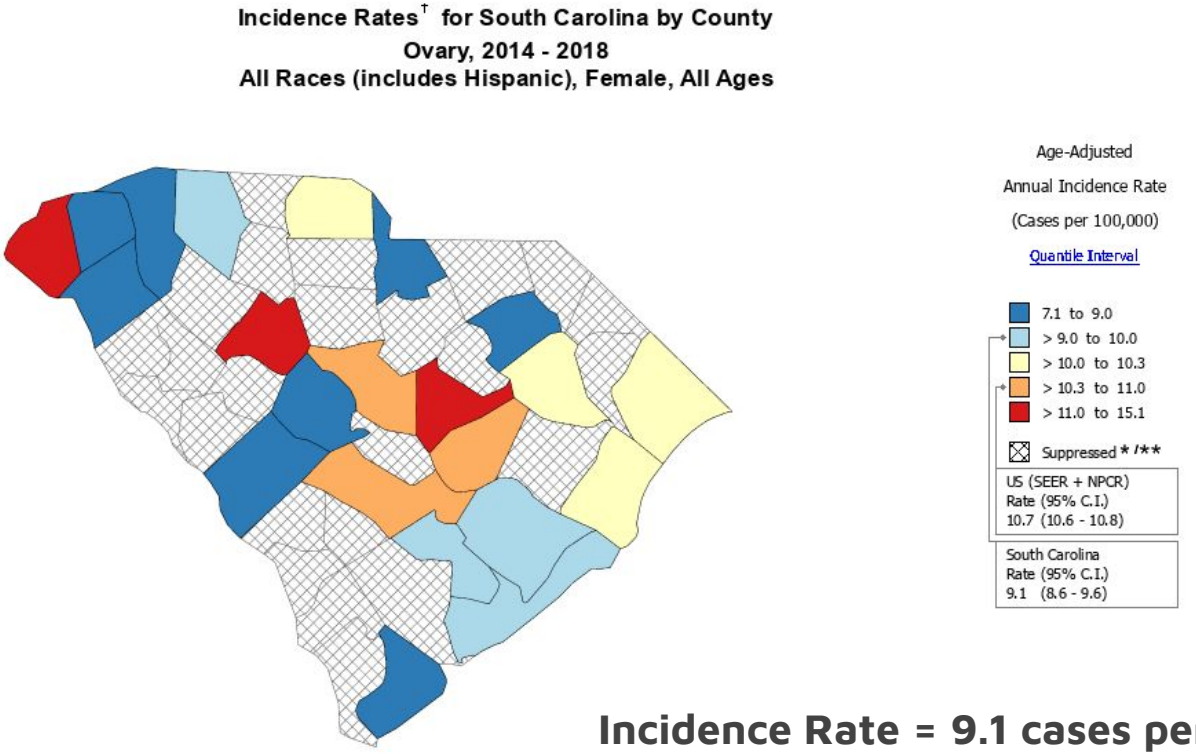
Zhang et al. 2019

# Incidence Across the United States (SEER)




**US IR = 10.7 cases per 100,000 people**

# Incidence in South Carolina (SEER)




**Incidence Rate = 9.1 cases per 100,000 people**

# Association Between Ovarian Cancer and SES

**Alberg, et. al. (2016) -** *Case-control study observing the risk of SES on Ovarian Cancer in African American women*

Relevant Findings:

- Odds ratio = 0.72
- Compared to women with a high school diploma or less, women with more education had an adjusted odds ratio of 0.72 (95% CI: 0.55, 0.93), and compared with women with an income less than $25,000, women with higher incomes had an adjusted odds ratio of 0.86 (95% CI: 0.66, 1.12)
- **Interpretation: Women with more education had 0.72 times the odds of developing Ovarian Cancer than women with less education. Women with a higher income had 0.86 times the odds of developing Ovarian Cancer than women with a lower income.**

# Association Between Ovarian Cancer and Occupation

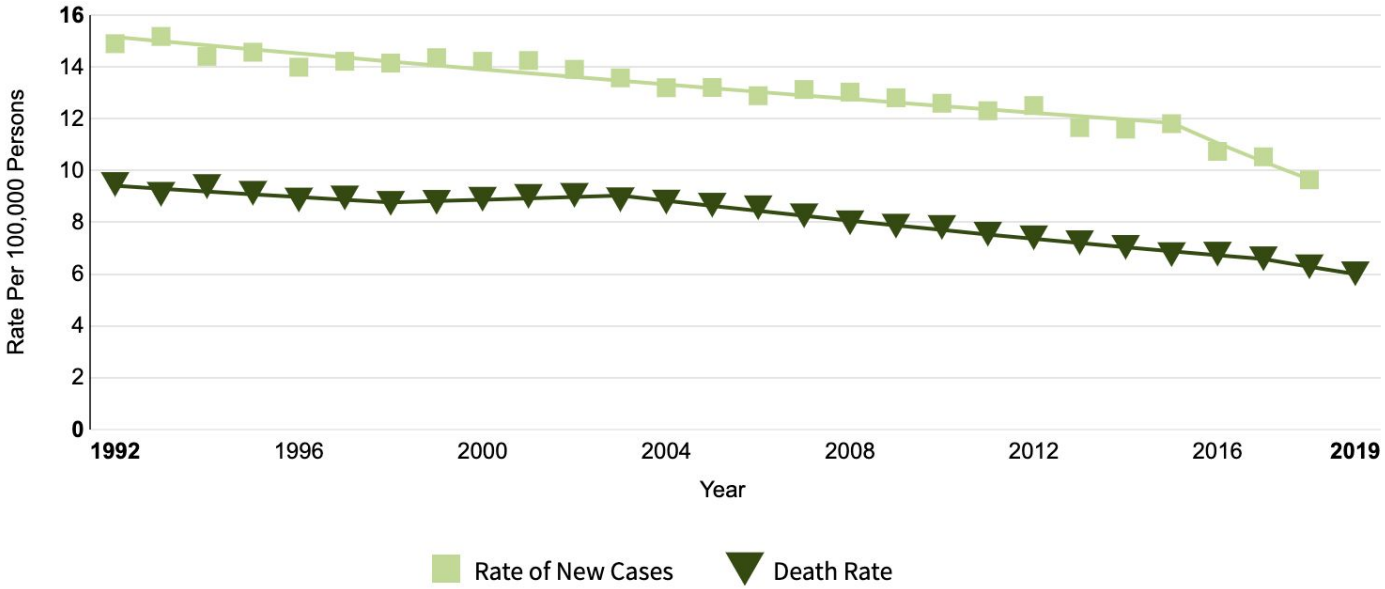
- 60% elevation in risk in graphic workers and pictorial artists, designers, and decorators (Shen et al., 1998)
- A study of paper and pulp workers showed that such workers were 50% more likely to have ovarian cancer than expected (Langseth and Andersen, 1999)
- Other commonly studied occupations: hairdressers, estheticians, nurses, educators → findings are still unclear and there exists a need for exploration

# Temporal Variation

# Temporal Variation of Ovarian Cancer

- In the US, overall ovarian cancer incidence declined by **29%** from **1985** (16.6 per 100,000) to **2014** (11.8 per 100,000), (Ovarian, 2022)
- The trends in ovarian cancer incidence coincided with temporal changes in the exposure of women from different birth cohorts to various reproductive risk factors, in particular, to **changes in the use of contraceptive methods** and to declining parity.
    - Oral contraceptive use corresponds to the prevention of approximately **30,000 OC cases every year** and has already prevented an estimated 200,000 OC cases and 100,000 deaths over the last **50 years** (Reid, 2017).
    - The Shanghai Women's Health Study cohort and found long-term IUD use of at least 20 years was associated with a 38% reduction in risk.
- Ovarian Cancer does not occur seasonally but can rarely become recurrent over time to patients when residual cancer cells persist during and after a patient's initial course of treatment, or when cancer cells return following preliminary therapy and a period of remission.
- The American Cancer Society estimates for ovarian cancer in the United States from now until the end of 2022 are: (Ovarian, 2022)
    - About 19,880 women will receive a new diagnosis of ovarian cancer.
    - About 12,810 women will die from ovarian cancer.

# Rate of Cases Over Time



# Hypothesis and Future Research

# Proposed Hypothesis & Future Research

- **Hypothesis:** We Hypothesize that women who are older, have an increased risk of developing ovarian cancer compared to women who are younger.
- **Future:** case-control study design: control group (ex. Below age 40/ages 15-40); case group (ex. Above age 40)
    - Get cases from cancer registry or hospital
    - Get controls as similar to cases (besides age) → general population, hospitals

- **Hypothesis:** We hypothesize that women with a lower SES, have an increased risk of developing ovarian cancer compared to women with higher SES.
    - *Case-control study observing the risk of SES on Ovarian Cancer in African American women*
- **Future:** Prospective cohort study based on SES → select a group of individuals free of ovarian cancer defined by SES status and follow them for 30 years.

# Proposed Hypothesis & Future Research Cont.

- **Hypothesis**: We hypothesize that women who use contraceptives have a decreased risk of ovarian cancer compared to women who do not use contraceptives.
    - The Shanghai Women's Health Study cohort and found long-term IUD use of at least 20 years was associated with a 38% reduction in risk.
- **Future**: Prospective cohort study on oral contraceptives → select a group of individuals free of ovarian cancer defined by exposure to oral contraceptives and follow them for 20 years.

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