# EFFECT OF SOCIOECONOMIC BACKGROUND ON BREAST CANCER MORTALITY RATES

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Breast cancer is the second leading cause of cancer-related deaths in women with over 43,000 estimated deaths for 2022, and is also the second most common cancer in women, making up 15% of all new cancer cases (*Cancer of the Breast (Female) - Cancer Stat Facts*, n.d.). This topic is significant because of how deadly breast cancer can be, as evident by its high mortality rate among women compared to other types of cancer as the second most common cancer-related cause of death (*Cancer of the Breast (Female) - Cancer Stat Facts*, n.d.). To ensure that all patients are receiving the quality of care necessary to enable recovery, analysis will be conducted to identify disparities in the mortality rates and outcomes of treatment across different socioeconomic groups (SEGs), and through that determine to what extent cost and accessibility has an impact on an individual's chance to survive breast cancer.

## BACKGROUND

Before the mid-1980s, breast cancer was a disease that had a reversed disparity across SEGs, where women in lower SEGs had a lower incidence rate and lower mortality rate relative to women from higher SEGs (Nattinger et al., 2017). However, with the development of better and more expensive treatments, the mortality rate disparity has shifted to be higher in lower SEGs. Across the three metrics of mortality rate, case fatality, and incidence rate, Lundqvist et al. found that individuals that were classified as having a background of a lower SEG had higher mortality rates and case fatalities, whereas higher SEGs had higher incidence rates (2016). The SEGs were determined by taking into account the subject's education, household disposable income, and occupation.

The higher mortality and case fatality could be due to either inaccessibility to more expensive and effective treatments or other lifestyle choices that impact health that are outside of the standard treatment procedures. The paper describes two types of factors that can impact the outcome of a cancer patient, “circumstances” and “efforts”. Circumstances are described as being factors that are exogenous and not under the person’s control, such as age or access to health care. Efforts are lifestyle factors such as exercise, diet, and alcohol use. By identifying the factors at play and categorizing them under those two types will help to determine how to address these variables that may be contributing to the disparity in the outcomes of breast cancer patients.

## SOCIAL CONSTRUCTION OF TECHNOLOGY

This social issue will be interpreted through the lens of social construction of technology (SCOT) as outlined by Pinch & Bijker, specifically looking at how interpretive flexibility between the various social groups or stakeholders results in conflict (1984). Specifically, as it relates to this topic, the primary stakeholders that will be the focus of this paper are women of both high and low SEGs; researchers who are developing new treatments and studying alternative solutions; and relevant government agencies that control regulations that are in place, such as the FDA. The conflict that will be discussed in the paper will be in relation to women from different SEGs, as their perspectives on the effectiveness of treatments and solutions are the ones in direct conflict. Cancer treatments are expensive, the newest and most effective ones more so, which can cause conflicting views on how useful they are depending on whether they can be afforded.

## ACCESS TO TREATMENTS AND NON-TREATMENT FACTORS

One of the most apparent differences in circumstances between lower and higher SEGs are their ability to afford more expensive treatments. Having less disposable income results in less access to treatments or medicines that could impact the mortality rate of patients. The paper by Nattinger et al. lists one potential example of this in the form of oral adjuvant antiendocrine therapies which have been found to decrease the recurrence of breast cancer by as much as 50% when taken across 5 years (2017). However, the therapy treatment is expensive and can cost over one thousand dollars pre-insurance for a month's supply (Nattinger et al., 2015). Another example of differing access to certain treatments is that higher SEGs were found to be more likely to have radiation therapy following breast conserving surgery, which would be a more expensive procedure (Lundqvist et al., 2016).

However, even when controlling for treatment factors, women in higher SEGs continued to have lower case fatality rates, indicating that there are factors outside of the treatments provided that have a significant impact on an individual's chances of survival. In support of this, a study by Binkley et al. that investigated the side effects associated with chemotherapy found that physical rehabilitation during or after treatment can increase a patient's chances of survival (2012). They also found that few women are referred to, or informed about the benefits of, rehabilitation. Further study into how different SEGs participate in or are informed about rehabilitation is necessary to determine if this is an effective method for improving survival rates for all patients. Discussions with the stakeholders could also help inform what methods of medical development should be prioritized to ensure that women from lower SEGs are also benefitting from new research instead of new medicines being targeted towards wealthier patients capable of affording expensive treatments.

## DIETARY FACTORS

One established risk factor for breast cancer that is affected by an individual's efforts, as defined in the paper by Lundqvist et al., is an individual's dietary habits (2016). In Thomson's paper about risks and benefits of diet in relation to breast cancer, diets with high amounts of consumption of polyunsaturated fats and alcohol led to a higher risk for breast cancer (2012). Alcohol consumption was found to increase risk of breast cancer in "low to moderate alcohol consumption", with increased risk from binge drinking (Thomson, 2012). A separate study looking into the trends of alcohol consumption based on socioeconomic status found that while members of higher income groups are more likely to drink more regularly, members of lower income groups are more likely to drank significantly more during a drinking occasion (Huckle et al., 2010). Awareness of this information, as well as improving resources available to people struggling with alcohol abuse could be a potential method for reducing breast cancer rates in women of lower SEGs preventatively. While this approach will likely have a low impact on the case fatality rate in women in low SEGs, it could potentially impact their overall mortality rate by decreasing the incidence rate.

Consumption of polyunsaturated fats was also found to lead to an increased risk for breast cancer (Thomson, 2012). Polyunsaturated fats are commonly found in vegetable oils, as well as some nuts and seeds such as sunflower seeds and canola seeds. This increases low SEG's risk for breast cancer in particular due to affordability of oils with polyunsaturated fats relative to those with monounsaturated fats, which the same study found consumption of to lead to no significant increase in risk for breast cancer (Thomson, 2012). Vegetable oils tend to be cheaper than oils that have more monounsaturated fats, such as olive oil, making them more accessible to

low-income groups for use in cooking. Vegetable oils are also commonly used for frying in fast food chains which tend to be fast and still cheap alternatives to cooking, with corn oil and soybean oil being chains such as Wendy's and Burger King (Jahren & Kraft, 2008).

The increased risk from polyunsaturated fats is in addition to high-fat diets already being associated with higher risk for breast cancer, with Thomson referencing one particular study from Europe that found a 2-fold increase in risk for breast cancer in individuals with high-fat food patterns (Schulz et al., 2008). Taking this in consideration that low SEGs are more likely to have diets that are higher in fats, and the effects of socioeconomic status on breast cancer through dietary patterns becomes reinforced (Power, 2005). However, finding a method to address this particular issue becomes difficult when there are few alternatives for healthier diets on lower incomes. Educating people on what types of foods or fats to avoid would only be effective to a degree until changes become implausible due to cost. Petitioning to the FDA for changes in regulation to change the types of fats and foods available in fast food restaurants that can lead to increased risk of breast cancer is also an option that has similar issues since it could potentially impact the price of their food options. Finding a cheap alternative for frying oils that are still healthy should be a long-term focus, however as far as short-term viable solutions go there needs to be a discussion with the stakeholders mentioned as to how to improve diets in the short term.

## DISCUSSION

Using the SCOT framework, treating members of lower and higher SEGs, as well as medical experts, as stakeholders that are consulted can help enact reforms that are both effective as well as acceptable (Pinch & Bijker, 1984). The discourse that occurs between the engineers

and designers and the social groups can improve how informed patients of all SEGs are, while guiding designers towards research or development that would result in the highest increase in survivability. The study by Binkley et al. is an example of this, highlighting how communication has brought to attention areas that need improvement, such as informing patients about chemotherapy side effects and how to address them (2012).

Lower SEG patients have a perspective on the factors that influence affordability and accessibility to the proper healthcare, and share with higher SEG patients in experiencing the overall quality of treatments that are available and how it impacts their lives. The conflict between the two social groups needs to be addressed by creating more treatments that are affordable, and thus more effective in a practical sense. Currently there are a wide range of treatments and procedures that are not accessible to women from lower SEGs, and are therefore not useful when compared to how higher SEG women who can afford them would view them as useful and effective. Medical health experts also have first-hand experience on what treatments tend to be most effective, as well as background knowledge to inform their perspective on what is effective, which can be applied to find a solution towards more affordable method of care for lower SEG patients

Lastly, government policy makers can influence what technology is accepted through FDA regulations and have an impact on how new treatments become accessible. The FDA can also control regulations around food to help promote healthier diets, and distribute dietary information to allow individuals to make more informed decisions on what they eat. They are also in control of programs like Medicare and Medicaid, which will influence what treatments are available to various individuals. By analyzing the disparities that exist between the different SEGs, as well as consulting the members of those same groups, more effective treatments or

policies could be enacted to decrease the mortality and case fatality rates for those disproportionately affected.

## CONCLUSION

The STS research topic seeks to decrease the disparity between different socioeconomic groups by targeting policies or accessibility to treatments. This paper identifies specific regions where disparities between socioeconomic groups impacts the mortality rates of women in lower SEGs disproportionately when compared to women in higher SEGs. In order to resolve the conflict on the effectiveness of treatments for breast cancer between the SEGs that exists due to the difference in available to each group, development of new treatments and methods of care must be developed with affordability in mind. A method to achieve this is to create an avenue for discourse between the various social groups to ensure that each of the stakeholders is considered when developing new treatments. Results of discourse between designers and the patient or medical expert social groups could help inform the course of research of new treatments, and impact the direction new legislation takes as it pertains to improving the accessibility of necessary care to patients, with the goal of decreasing the disparity in mortality rates between women of different SEGs.

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