Social Determinants of Health

The Association between Self-rated Global and Mental Health & Socioeconomic Status in Breast Cancer Survivors

Jana Alexandra Pohl

Thesis submitted as a part of the Master of Philosophy Degree
in Health Economics, Policy and Management

Department of Health Management and Health Economics
The Faculty of Medicine

UNIVERSITY OF OSLO

May 2014

2014

Social Determinants of Health - The Association between Self-rated Global and Mental Health & Socioeconomic Status in Breast Cancer Survivors

Jana Alexandra Pohl

http://www.duo.uio.no/

Print: Reprosentralen, University of Oslo

Abstract

Background

Health is a complex construct that is determined by various factors. Socioeconomic status is one of its determinants and contributes to persisting health inequities. Health differences have been found for people after health shocks. In light of improved treatment outcomes, there is an increasing number of survivors of health shocks. It needs to be assessed if the factors determining their health, measured by self-rated health, differ.

Approach

My aim is to compare the association of socioeconomic status and self-rated health between breast cancer survivors and the general population. Apart from global self-rated health I include self-rated mental health as a major area of concern in breast cancer treatment. I also investigate the impact of social capital and breast cancer treatment on self-rated health. Chronic diseases are sometimes labeled as health shocks; hence I explore and compare this sub sample of the general population.

Method

Analyses are based on a cross sectional study design comparing data from the general Norwegian population and Norwegian breast cancer survivors. Data is retrieved from surveys conducted in 2009 and 2012. I mainly use logistic regression analyses. Self-rated global and mental health are used as outcome variables. Socioeconomic status is based on income, education and employment status. Social capital is assessed with social network variables.

Results

I find that breast cancer survivors overall report lower perceived global and mental health. Their health status is not strongly influenced by socioeconomic status or social capital; most treatment variables do not have a significant impact either. For the general population, a strong association can be confirmed. The presence of chronic disease does not significantly change the relationship observed for the overall general population.

Conclusion

Social determinants of health are important to consider when discussing health inequities. Self-rated health of breast cancer survivors seems to be more strongly influenced by other factors. This needs to be investigated further to optimize care for survivors of breast cancer.

Disclaimer

Some of the data applied in the analysis in this publication are based on "Survey on living conditions, health, care and social contact 2012". The data are provided by Statistics Norway, and prepared and made available by the Norwegian Social Science Data Services (NSD). Neither Statistics Norway, nor NSD are responsible for the analysis/interpretation of the data presented here.

The translation of questions and response options for the included Norwegian surveys into English are performed by the author of this thesis.

Acknowledgement

The process of writing this thesis has been an adventurous way that marks the end of the wonderful two years I could spend in Oslo. This experience would not have been possible without my family who has supported me in all imaginable aspects throughout this time. More people than I could mention here made studying this Master's program an amazing experience that I will always look back to with joy and gratefulness. I want to thank all the people that I am happy to call my friends in Norway, Germany and all around the world for your inspiration and motivation.

At the University of Oslo I especially want to thank my supervisor Eline Aas who helped me to write this Thesis through her constant support and valuable feedback. I want to thank the entire teaching and administrative staff of the department of health management and health economics for providing knowledge and guidance that finally enabled me to hand in this thesis.

Abbreviations

WHO World Health Organization

NSD Norwegian Social Science Data Services

SES Socioeconomic status

BCS Breast cancer survivors

GP General population

OR Odds Ratio

CI Confidence interval

Table of Contents

List of Tables

List of Figures

1 Introduction

What does it mean to report good health? Who is it that reports good health? Today, people are living longer and they are living longer with diseases. From a medical standpoint, the world's population is healthier than ever, still not everyone who is free of medical diseases reports good health. On the other hand, some of the people experiencing a severe disease do report good health. Known factors associated with reported health are social determinants, indicating existing inequities. Reducing inequities in health is a major concern in most countries (Marmot et al., 2011). Political action should be informed and encouraged to reduce health inequities in availability, access and outcome of health care services. The question remains, what needs to be done for whom? With improving medical care, an increasing number of people survive health shocks, such as breast cancer. There are inequities in breast cancer survival (Kravdal, 2000), while the health of survivors gets increasing attention (Wen et al., 2013). There is a need to investigate if there are underlying social determinants of the health of survivors as well. Thus, this thesis explores if social determinants are associated with self-rated health outcomes for breast cancer survivors (BCS) in similar ways as for the general population (GP). I will especially focus on the impact of socioeconomic status (SES).

The World Health Organization (WHO) defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 1948). Health is understood as a global experience and a level of functioning as part of the overall quality of life (Bjorner et al., 1996). Its determinants are genetics and the physical- and social environment (Jusot et al., 2008). Denton and Walters (1999) suggest the distinction between structural and behavioral aspects determining health. Structural social inequalities are increasingly seen as the most important one (Aas et al., 2013). Social determinants of health are "the conditions in which people are born, grow, live, work and age" (WHO, 2008). Health of an individual develops and exists within a society with its interactions, pathways and social forces (Berkman et al., 2000). It is influenced by the surrounding political, cultural and institutional factors. The degree of experienced health and longevity is not up to chance but a result of the social, political and economic environment (Marmot et al., 2011). Social determinants of health are especially relevant with regards to persisting and even increasing social inequalities (Berkman et al., 2000) in developing and developed countries (Kravdal, 2000). Studies from various countries show that socially disadvantaged people experience lower health (Franks et al., 2003). Political welfare initiatives to reduce health inequities can save social

and economic costs for individuals and the society by increasing well-being, social cohesion and economic development (Marmot et al., 2011).

To analyze the association between social determinants and health, the population can be divided into various sub groups, whose characteristics and needs must be assessed individually. One of those sub groups are people who experienced a health shock like breast cancer and survived. Survivorship is a life-long dynamic process that begins after the completion of medical treatment (Parry, 2007). Besides the overall health state, mental health is especially relevant for this group. Patients have to learn coping with the memories of treatment and the possibility of recurrence. Knowledge about the impact of treatment on the survivors' function, physical activity and social participation is still lacking. Research shows unmet physical and emotional needs of survivors (Wen et al., 2013) and identifies a need for improved access to health care services (Treanor & Donnelly, 2012). Female BCS report lower well-being and higher psychological distress (Inbar et al., 2013). Therefore it becomes increasingly relevant to assess influences on their perception of health. Based on this, interventions should be developed to improve their well-being and quality of life and to reduce the probability of recurrences and co morbidities (Cooney et al., 2013).

To assess the association between SES and self-rated health for BCS, this thesis will begin with a further exploration of the concept of health. I will discuss overall and mental health and present how they are understood and measured here. I will continue with describing and discussing social determinants of health with the main focus on SES. This part presents underlying theory and empirical findings for SES and its measures in their relation to health. Apart from socioeconomic status I will consider other factors as well to give credit to the complexity of the relationship. I will explore the concept of social capital, an increasingly researched aspect, and argue for its inclusion here. An important dimension is risk adjustment through various variables that I will present and show their relationship with health. As final chapter on the theoretical and empirical background I will introduce the concept of health shocks and set breast cancer in this context. Subsequently I will give a detailed review of my research question and start with presenting the analyzed data. I will compare a sample of Norwegian BCS with a sample from the general Norwegian population. After a chapter on methods I will show the results of performed analyses. Finally I will critically discuss the analysis in context of the empirical and theoretical background and draw a conclusion.

2 Health

Health on an individual level can be assessed in different ways: as Quality-Adjusted Life Years, in survival, as well-being, as the clinical medical status or the person's own perception. Based on the WHO's definition of health, when one wants to assess the overall health state, it is important to use an instrument that allows the respondent to discriminate different health states on a continuum and to take all the different dimensions of health into account. This can be achieved by using self-rated health where the respondent reports his or her perceived health. It has become the most commonly used variable in health research (Baron-Epel & Kaplan, 2001) and was found to be reliable (Ostrove, 2000). It has been named differently, for example self-reported, self-assessed or self-weighed (see Fayers & Hays, 2005) but I will refer to self-rated health in the following. It is used to assess a patient's or a respondent of the general population's health, the overall impact of treatment and management of long term care to increase the quality of life (French et al., 2012). It can be used as a measure of health state at a certain point in time or as an endpoint in a clinical trial and screening for high-risk groups.

The impact of physical, psychological, mental and social factors will differ between individuals that report their health state. The challenge is identifying the introspective cognitive processing of health related information to understand the determinants of the individual response (Baron-Epel & Kaplan, 2001). Different models have been developed but the actual processes have not yet been identified, respondents are also often unable to express the reasoning behind their assessment (Bjorner et al., 1996).

Jylha (2009) has suggested a model building on previous research (Bjorner et al., 1996) to help understanding the underlying processes. She suggests that the respondent reviews facts about his health, including medical diagnoses, health behavior and vulnerability – including family disposition, risk-factors and pre-clinical disease stages – and maybe most importantly functional limitations that he or she deems relevant. Life events and the SES find consideration (Benyamini et al., 2000; Fayers & Hays, 2005). The researcher does not know which aspects the respondent focuses on and weighs together. Models have been developed to determine, which social, environmental and personality factors influence the inclusion of certain aspects (see Fayers & Hays, 2005). Those aspects are in relationship and influence each other, which is described in more detailed models (see Bjorner et al., 1996). The person then makes

a comparison with a reference group before deciding, which possible response option best matches the evaluation. The reference group theory argues that the reference group provides a standard or internal norm for judgment. It might change over time and with certain experiences, which explains positive ratings among elderly or sick people. This response shift describes the phenomenon that people adapt to changed health conditions by changing their internal standards, values and conceptualization of health (Fayers & Hays, 2005).

The perceived health status often differs from the clinically assessed medical status and may be even more accurate to predict future outcomes (Goldman et al., 2004) like functional disability and mortality (Bjorner et al., 1996). They should be considered as two perspectives which are both valid and should be taken into account. Self-rating provides a valid and cost-effective way of assessing health; also if other information is lacking (Baron-Epel & Kaplan, 2001) since it has low costs and is easy to collect (Bjorner et al., 1996). It makes the assessment more independent of the examiner; it eliminates inter-rater variance (Cheville et al., 2014).

It has been shown that disease can change health perceptions which in turn influence the recovery process (Wilcox et al., 1996, Benyamini et al., 2000). Especially in breast cancer care, self-rated health is strongly linked to long term survival (Shadbolt et al., 2002). Interventions should regard factors like costs, side effects and length of as well as quality of life as important besides morbidity and mortality as outcome variables (Bjorner et al., 1996).

Besides the overall health state, the concept of self-rating of health status can be used in different domains of physical or mental health perceptions, physical functioning and role functioning (Franks et al., 2003). These more specific domains of health also have predictive power for future health outcomes. The results seem to vary from overall health ratings (Lee, 2000). I will start with describing the overall health state, referred to as global self-rated health, followed by the argumentation for the inclusion of mental health.

2.1 Global Self-rated Health

The most common form to assess the overall health state is a single global question that shall provide a condensed score of how the respondent perceives his or her health state. Global self-rated health is an aspect of the general health status, which again is included in the concept of health related quality of life. So the question cannot be used to measure general health

or health related quality of life but rather indicates the perception of symptoms, well-being, general health and vulnerability of people (Bjorner et al., 1996). Studies confirms that it is reliable for the general population and across a wide range of illnesses, among them breast cancer (Bjorner et al., 1996). Global self-rated health for people with a chronic disease is shown to be lower but the difference to the general population might be smaller than the difference in medical status (Fayers & Hays, 2005).

Global self-rated health's role and acknowledgement has been increasing in clinical practice, research and policy (Franks et al., 2003). It is considered to be an important indicator of population health and healthy life expectancy by the WHO (French et al., 2012). This is due to many studies that find it to be related to and a predictor in form of a risk indicator for many future health outcomes like morbidity, health care utilization, physical and functional status, discharge from labor force, physician ratings of health and even mortality rates. This association also holds true when controlled for other risk factors, which supports the validity of global self-rated health as a measure of health.

To measure the health status or health-related quality of life, generic or disease specific standard instruments are used, which include multiple items that cover sub dimensions. Nonetheless, researchers showed that the different dimensions can be considered to belong to one overall dimension (Fayers &Sprangers, 2002). Mostly, a question on the overall health state to account for aspects not covered in the other items is included at the end or the beginning of the questionnaire. The positioning within the questionnaire has no influence on the result. These questionnaires can also provide a summary score, which have the advantage that the researcher knows, which dimensions contribute to it but the disadvantage that those might not be the ones relevant to the patient (Fayers & Hays, 2005). Global self-rated health can also be assessed in multi-scale instruments but an approach with only one question allows the respondent to take those aspects, most important to him, into account.

Attention has to be paid to the formulation of the question assessing global self-rated health. The question is usually not framed and formulated in a broad and open, fairly abstract way asking the respondent to evaluate his health in general without defining health so that the respondent can take all dimensions of health into account (Baron-Epel & Kaplan, 2001; Fayers & Sprangers, 2002). There has been a broad variety of different questions and response options. One option is to leave the question entirely open, but there have been attempts to specify certain elements. Those include the time frame and the reference group. Research shows

that the formulation of the question does not have an influence on the predictive power of the instrument so that no particular wording is superior. This can be expected since comparisons and assessments are assumed to be made implicitly (Baron-Epel & Kaplan, 2001).

Instruments with floor and ceiling effects, where positive or negative health states cannot be adequately discriminated, should be avoided. Most commonly, the response options are categorical with four or five states on a Likert scale. Other options with more categories or visual analogue scale have also been used. Nonetheless, a use of standard wordings allows comparisons across studies and should therefore be preferred (Fayers & Hays, 2005). For validation of global self-rated health, the use of biomarkers is suggested (French et al., 2012). Besides quantitative analysis, qualitative approaches to measure global self-rated health have been developed as well (for a summary see Fayers and Hays (2005), p. 318).

Especially the predictive power for mortality has driven the research on self-rated health. The association has been shown for both genders, different age groups and cultures and holds even when controlled for health status, psychological functioning and SES (Benyamini & Idler, 1999; Idler & Benyamini, 1997), although its independent predictive power is not undisputed (compare Bath, 2003). Nonetheless, unadjusted models consistently find an association both in short term and in long term mortality (Benyamini et al., 2003). Patient ratings have been found to be even more accurate in predicting mortality than medical assessments (Bjorner et al., 1996). There is discrimination among health states, even among positive ones and it holds when controlled for potential confounders, most importantly medical health. Ratings are shown to decline in the years before death and before adverse events occur (Fayers & Hays, 2005). This supports global self-rated health as a measure of health and its prognostic power and suggests that response-shift does not occur (Fayers & Sprangers, 2002). It also contradicts the hypothesis that self-rated health mostly reflects personality (Fayers & Hays, 2005). Two types of models have been developed to explain the relationship between global self-rated health and mortality.

The first one builds upon the fact that global self-rated health allows the respondent to consider all relevant factors, more than could be included in a multi-item instrument or in the medical status (Barsky et al., 1992). The patient can consider and include early perceptions of diseases (Fayers & Sprangers, 2002). Secondly, self-rating of health may also affect subsequent health. Health perception affects the future health status through its influence on many health and behavioral factors (Barsky et al., 1992). For example a positive attitude towards

health may encourage people to engage in a healthy lifestyle, motivate to increase efforts for recovery after adverse health events and seek medical care earlier (Fayers & Hays, 2005). The self-rated health of cancer survivors is especially connected with post treatment and self-care management (Jung et al., 2013).

Overall, global self-rated health has the potential to monitor the outcome and quality of clinical and public health programs since it is extremely sensitive to the respondent's view of health (Franks et al., 2003) and has a long term predictive effect (Fayers & Hays, 2005). This effect is complex and influenced by different variables. In conclusion, global self-rated health can capture the total effect of an intervention when it affects a broad range of outcomes although we do not completely understand the underlying cognitive processes.

2.2 Mental Health

Mental health is frequently addressed in breast cancer treatment and rehabilitation. Breast cancer patients have a higher prevalence of clinical mental health disorders (Colby & Shifren, 2012) that differs between different countries (WHO, 2004). Those patients have a higher risk of complications (Fox et al., 2013).

In psychiatric context, mental health is understood as a rather dichotomous dimension, focusing on having or not having clinical, diagnosable often co morbid disorders. This view on mental health has been criticized. Consequently a definition of mental health describing it as a state of successful mental functioning that results in productive activities, having relationships with people and the ability to adapt to change and to cope with adversity, has been developed (Keyes, 2005). It also asks for more consideration of the interactions between physical diseases and psychological distress. Mental disorders are usually measured with clinical instruments such as International Classification of Diseases or the Diagnostic and Statistical Manual of Mental Disorders (Kessler & Zhao, 1999). Mental health is difficult to assess and patients' reporting of mood might differ from a physician's assessment (Cheville et al., 2014) so that self-reporting of mental health can be seen as an additional source of information (Espallargues et al., 2000).

The absence of a mental disease is not equal to a high level of well-being (Keyes, 2005). Negative symptoms like sadness, despair, anxiety, fear, agitation and anger are shown to be responses to life events that need to be distinguished from clinical mental disorders. Depres-

sion is seen as the major mental response to diseases (Aneshensel et al., 1984). In this context it is not understood as a clinical disorder but as a symptom (Berkman et al., 2000). This implies different appropriate treatment strategies and entails the danger of over or under treating people and unnecessary stigmata (Wakefield et al., 2013). Therefore, this thesis does not focus on mental disorders but on subclinical symptoms. They are defined in the concept of common mental disorders that include a broad range of more or less severe psychological disturbances (Kosidou et al., 2011). Common mental disorders are seen as normal responses to health shocks. The psychological impacts of health shocks are increasingly considered to improve the quality of life for patients (Colby & Shifren, 2012). They shall be enabled to deal with their emotional and psychological stress reactions that appear in relation to diagnosis (Miller et al., 1976), throughout the treatment process and in survivorship.

In the literature, psychological well-being, also described as flourishing or the presence of mental health and psychological distress or the absence of mental health, languishing, are often considered as separate dimensions on distinct axes of mental health and not in a continuum (Headey et al., 1993). Different models capturing well-being have been developed that show a good fit with observed differences (Ryff & Keyes, 1995). Many people are free of mental disorders but do not feel entirely healthy or well-functioning and consequently use mental health services although there is no mental disorder diagnosed (Keyes, 2005). Non perfect mental health could imply an underlying mental disorder and should be monitored carefully (WHO, 2004). Only very few people are completely free of psychological distress but benefits arise on each improvement along the continuum.

That is why recently there has been a focus on positive psychology, suggesting to not only take negative aspects but also positive dimensions of well-being into account (Keyes & Lopez, 2002). Dimensions of mental health include emotional, psychological and social well-being while mental illness is measured for example by major depressive episodes or alcohol dependence (Keyes, 2005). Researchers showed that determinants of well-being are demographic and socioeconomic variables as well as personality, genetic predisposition and goals (Keyes & Waterman, 2003). Personality determines emotional reactions and perceptions of diagnosis and treatment as negative and threatening or as challenging (Colby & Shifren, 2012). This has led to a change in the setup of mental health care that now focuses more on helping people cope with stressful life events and finding treatment strategies to help patients actually recover (Wakefield et al., 2013) and build up social resources for emotional support.

Social support can buffer stressful environmental influences (Lee et al., 2004). Emotional support, mainly from physicians is especially important for cancer survivor's mental and physical health (Mello et al., 2012). Also improving health literacy by different interventions will improve the care for mental health disorders in the public society (Jorm, 2012).

Mental health has been found to influence productivity and satisfaction (Keyes &Waterman, 2003). This is consistently found for different countries (French et al., 2012). It has a strong independent relationship with mortality (Franks et al., 2003). It affects the way people perceive their overall health status and their use of health care services (Mechanic, 1978). People with psychological distress feel less physically healthy, their optimism is reduced and the awareness and intensity of bodily symptoms is increased, so people with poorer mental health rated their physical health as poorer as well and conversely a negative perception of physical health correlates with mental health symptoms (Barsky et al., 1992).

There exists no standard of how to measure mental health (Keyes, 2005) but many mental health assessment inventories have been developed. Most cover multiple sub dimensions with the aim of building a score at the end. There are constant discussions going on to validate each instrument based on regularly updated reference numbers. One aim of building scores is the comparison of instruments but it also leads to a lack of detailed information and tests might not be comparable since they cover different underlying phenomena.

The suggested dimensions that should be measured when assessing mental health in subclinical states are life satisfaction, positive affect or emotional distress, anxiety, depressive mood and fatigue. Their interactions are complex. Life satisfaction is strongly correlated with depression, while a person might be satisfied but anxious (Headey et al., 1993). Anxiety about the health state seems to be more influential among young people, whereas older people tend to deny symptoms to diminish anxiety (McCrea et al., 1976). Languishing measured as depression is associated with lower perceived emotional health, limitations of daily activities and days unable to work. Breast cancer patients report more positive than negative mental health with more optimism than pessimism and do well in quality of life areas. Those reporting more depressive symptoms also show lower quality of life values. Those who score higher on optimism report better social and mental health (Colby & Shifren, 2012).

3 Social Determinants and Health

3.1 Socioeconomic Status

In a long tradition of research, SES has been the most important construct to capture social determinants of health. There are different theoretical approaches underlying the analysis of SES. One can broadly distinguish between the Marxian, the Weberian and the Functionalist tradition (Berkman et al., 2000, pp.14). They differ according to their view of society and why and how society is stratified into different groups. Marxian theory argues that the underlying reason for stratification is exploitation of lower SES groups. In Weberian tradition the reasons are fewer accessible material and intellectual resources in low SES groups. The Functionalist tradition assumes fewer accessible care or lack of prestige to cause poor health. Those who are exploited, dominated or excluded possess less protective resources and have less control over the exposure to damaging resources and risk factors. These mechanisms create disadvantaged individuals, families and neighborhoods that are exposed to damaging influences and have less protective resources. Neighborhood poverty and mortality is independent of individual level SES and a research topic of its own (Doubeni et al., 2012); I will focus on individual level SES here.

SES is a complex construct where one tries to best capture social and economic factors that influence what position an individual holds within the society. Many terms have been used to describe the concept; I will use the term socioeconomic status (SES) here. It reflects social structures that differentiate groups according to economic and social characteristics valued in society. The most common approach is to measure individual knowledge, credentials, skills and assets. These are indicators of the resources buffering the impact of damaging economic or social events and opportunities, for example for a better paid job the individual has. The materially related economic, political, symbolic, psychological and behavioral factors should be considered. The traditional measures for SES include education, employment and income or wealth (Mackenbach et al., 2008).

There are different suggested theoretical pathways how external social conditions influence individual internal health. This thesis is exploratory since hypotheses are not derived from a rigorous economic model but rather based around existing theoretical frameworks.

Based on a model, first developed by Grossman in 1972 (Rocco & Fumagalli, 2014) health capital can be accumulated through investments over time. Inputs can be medical services, lifestyles and working and housing conditions, which are transformed into health according to the health production function. Health is considered part of the overall utility and individuals are assumed to be utility-maximizing. Health has different determinants: based on preferences and possibilities, individuals will invest optimally in their health. A better health state can be achieved by becoming a more productive health producer or by investing today in order to obtain higher benefits in the future, which is partly determined by SES. The possibility and ability to invest depends on environmental, economic and social factors beyond the control of the individual. How these material and intellectual resources are distributed is an assessment of the equity of resource allocation, social exclusion and power relations in a society (Berkman et al., 2000). In that context, socioeconomic factors can be seen as constraints or risk factors that are distributed along a continuum where small shifts can make a large difference in the health status (Berkman et al., 2000).

The more recently developed stress theory focuses on psychological resources (Scheid & Brown, 2010). It sees socioeconomic factors as potential chronic stressors (Baum et al., 1999). These psychobiological risks are accumulated during the life course (Matthews & Gallo, 2011). The association establishes through emotional and cognitive brain development from childhood on with experiences typical for different SES levels that lead to internalizing health perceptions and behaviors (Hackman et al., 2010) as well as childhood health which partly determines adult health. In this concept, psychological resources like optimism, coping style, a sense of control and social support, may mediate the relationship between SES and health.

Being exposed to low SES might be internalized as chronic stress. Stress is understood as psychological distress and physical stress that in the end leads to lower health. Chronic stressors, imposed by the environment, affect physical and psychological function, well-being and health behaviors (Pearson et al., 2013). Psychological states of stress and health behaviors can be seen as responses to adverse conditions that are imposed by socioeconomic structures (Berkman et al., 2000). One approach is to investigate how external conditions shape emotions as responses to events. Emotions determine physiological, cognitive and behavioral responses to meaningful events and therefore translate external factors into health.

A mechanism for the association between SES and health is health communication. Communication inequalities are due to individual differences in accessing, processing and utilizing information. These attributes differ among SES groups with disadvantages for those of lower status (Ramanadhan & Viswanath, 2006).

The association between SES and health status could either indicate that having a certain SES determines the health status in social causation; or in reverse causality, social selection might take place with those being in poor physical and mental health conditions ending up in lower SES groups. This is because the association is partly due to risk associated unhealthy lifestyle practices (Doubeni et al., 2012). The two possibilities are not mutually exclusive and may be relevant at different points in the life course. It is argued that the social causation assumption is needed to explain the gradient in health differences along the SES continuum (Kosidou et al., 2011).

The relationship between health and SES is well established. Most studies are based on the framework by Grossman (Rocco & Fumagalli, 2014) and over the years, findings confirming the stress theory have accumulated. Evidence exists for social causation and social selection for general and for mental health (Hackman et al., 2010). The effects of SES on overall health are best captured and reflected by self-ratings since they are directly perceived (Franks et al, 2003). Factors that have been shown to be correlated with self-reported health are: functional ability, clinical risk factors, medical diagnoses, health care utilization, physical and mental symptoms, cognitive capacity, health behaviors and socioeconomic and demographic factors (Goldman et al., 2004). Different SES groups show different determinants of health (Denton & Walters, 1999).

A substantial body of research shows associations between different health status measurements and SES (Baron-Epel & Kaplan, 2001). The relationship is consistently found across time periods, demographic groups, age groups and various measures of SES. SES has been linked to morbidity, life-expectancy within a country (Marmot et al., 2011) and premature mortality. Studies found differences between and within European countries (Marmot et al., 2011). In more egalitarian countries like Norway, the findings are consistent although the magnitude of differences between SES groups is lower (Mackenbach et al., 2008).

All levels of SES show an impact with a clear gradient on health with impacts on anxious and depressive symptoms and social problems (Kosidou et al., 2011, Back & Lee, 2011). It is also

found for breast cancer patients (Wen et al., 2013, Jung et al., 2013). It is confirmed by the analysis of biomarkers (Goldman et al., 2004). Everyone except for those in the highest SES group experience an inverse relationship between the two. The influence of SES on health status is less pronounced for those in worse health states (Doubeni et al., 2012). Researchers found that rates of death and poorer self-assessment of health are substantially higher in groups of low SES and vice versa. Living in low SES groups is toxic for one's physical, mental (Kosidou et al., 2011) and overall health (Franks et al., 2003).

Based on a literature review by Bjorner et al. (1996), overall health is clearly associated with medical diagnoses, physical symptoms, physical function, mental symptoms and education. Controversial results have been shown for employment, ethnicity and age. Overall positive associations have been found for gender, marital status and social network. Another factor often considered is income (Franks et al., 2003). When it comes to mental health, results for common mental disorders are increasingly but not uniformly positive, suggesting stronger associations for more severe symptoms (Kosidou et al., 2011). Many studies show that stress as a contextual influence is correlated to mental health, mainly depressive symptoms (Lee et al., 2004). Higher educated and married respondents are more likely to be mentally healthy (Keyes, 2002). Studies also show occupation and income to be related (Kosidou et al., 2011).

Psychological distress has been found to be consistently associated with a low SES, whereas health damaging behavior is not (Lazzarino et al., 2014). Emotions have been linked to both, SES and health. Information seeking is positively related to emotional support, self-care and coping abilities after diagnosis and treatment of a disease (Jung et al., 2013). Those actively seeking information beyond the advice given by physicians are more likely to be from a higher SES group (Ramanadhan & Viswanath., 2006). A higher SES level is associated with more knowledge about causes, risks and treatment options for diseases (Viswanath et al., 2006) and therefore increases productivity.

3.1.1 Measures of Socioeconomic Status

The traditional measures of SES – income, education and employment status – have been shown to be significantly associated with health outcomes in univariate and multivariate analyses (Franks et al., 2003). Argumentation for their inclusion is mainly based on Weberian and Marxian theories. They might differ in their importance throughout the SES continuum. Backlund et al. (1999) suggest that mortality is especially dependent on income in lower SES

groups while education is more important in higher SES groups, although this hypothesis has been challenged by other authors (Franks et al., 2003). Still, they are highly interrelated; the educational level is usually predictive for available future jobs which determine the income (Berkman et al., 2000). Nonetheless, studies find an effect of all variables on health outcomes when adjusted for each other (Backlund et al., 1999).

3.1.1.1 Income

Income provides the resources to access different lifestyles, provides a sense of security and affects the perceived rank in society. It is therefore a main part of the Weberian concept of SES. It enables to buy necessary goods related to housing, food, clothing, transportation, and medical care, opportunities for activities, child care and exposure to toxins that may influence health. More income is associated with higher levels of perceived health (Franks et al., 2003, Backlund et al., 1999). For high income groups, self-rated health is highly associated with physical and mental health variables. For low income groups, the association is strong for physical health variables and only weak for mental health variables.

Adequate income is a buffer from many daily financial, social and environmental stresses that may have physical consequences. It allows maintaining and improving the health status (Yamamura, 2011). It has a diminishing impact if one exceeds an adequate income level. Nevertheless, health differences exist across all income levels. Added benefits through access to higher quality and a bigger variety of goods, opportunities and conditions has immediate and cumulative benefits over the life course and influences the SES and health status of future generations as well.

Income has an extra monetary dimension by influencing psychological states, health behaviors and social circumstances; those with the lowest paid jobs experience higher job and financial insecurity, more unemployment and work injury as well as worse lifestyle habits. The length of time spent in and the number of times experiencing economic hardship shows a strong association with physical, psychological and cognitive functioning (Berkman et al., 2000). Income also allows accessing the skills and labor of others. It can therefore be seen as a resource to respond to and to buffer social and economic stress. Income is the main variable in the framework of Grossman, all investments will reflect in income. Higher income allows more investments in health and reduces the relative costs and therefore the financial risk of illness.

Income inequality – the gap between the rich and the poor in society – between and within geographical units like countries, regions, communities or neighborhoods, opposed to the common absolute measure of income, is a vastly researched topic (Rostila et al., 2012). The income distribution has been shown to be linked to mortality and health problems on individual level even in countries with an egalitarian income distribution like Norway. There are still controversies about the effect since it is for example influenced by the chosen level of aggregation and different effects on various sub-groups in different contexts, so that some authors suggest a threshold effect of inequality beyond which it has an effect on health (Kondo et al., 2009). This association might be explained psychologically or materialistically (Rostila et al., 2012).

3.1.1.2 Education

Longer education is consistently associated with better perceived health, even for people of equal health state (Baron-Epel & Kaplan, 2001). In egalitarian and wealthy countries like Norway, income and education are not perfectly correlated. On average about 34% of the Norwegian adult population has attended higher education (Aas et al., 2013). It is an indicator for SES since it is associated with acquired knowledge of healthy lifestyles and behavior, the opportunity to relate to a complex environment and skills in managing the social system, less occupational restrictions and more job control. Education involves gathering facts, learning concepts and finding out how to access information. It provides cognitive, material, social and psychological resources that may influence health. Education helps limiting the impact of adverse health events (Wagstaff & Lindelow, 2013). This also follows the Weberian concept of SES. In the framework developed by Grossman, years of education are considered an investment, where income is sacrificed now for the benefit of expected higher income in the future. A higher level of education is associated with increased productivity. This enhances the benefits of investments, for example retrieving health related information.

Years of education are often reflected in the highest achieved level of education. This is usually easily accessible which makes it popular to use. Some authors only use education to capture SES (Benyamini et al., 2000). Like income, education also affects the psychological and social environment, social networks and the perceived status in society besides a material and cognitive value (Backlund et al., 1999).

The number of years in education is globally found to be inversely related with perceived health, mortality (Subramanian et al., 2010) and anxiety and depression (Bjelland et al., 2008). One finds a dose-response, those with fewer years of education report lower health and vice versa. This has also been shown for Norway with increasing educational inequalities over the last years (Strand et al., 2010). The level of education usually determines the transition to the working environment, where educational success reflects the likelihood of future success in the labor market. Education is especially closely related to the attainment of a job and the type of job that can be pursued.

3.1.1.3 Employment

Work is the major structural link between education and income. There are multiple pathways through which work can affect health (Berkman et al., 2000). Levels of health are influenced by whether or not people are employed, the degree of job security, if they work full- or part time, the types of shifts they work and the social organization of work. Especially the working environment and its impact on physical and psychological health have been investigated. Working environments with high risks for physical dangers are more common for those with lower education levels. Psychological demand, decision latitude, social support and the opportunity to help others form the social and psychological environment (Denton & Walters, 1999); conditions with high demand, low decision latitude and low social support are often related to the poorest health outcomes. Employment seems to have a bigger role for males than for females in determining mental health (Kosidou et al., 2011). Work also gives people's life a timely structure for each day and it implies regular experiences and contacts with others. It also defines aspects of personal status and identity and enforces activity. Besides the chronic impact of the work environment, the impact of transitions are important. Main transitions are from education to the initial job, from working to becoming unemployed and from working to retiring or changing the working hours. Other transitions and changes in specific aspects of the job are also possible.

Especially unemployment has an important impact on health. In 2014, the unemployment rate for Norway is 3.5 % (Trading Economics, 2014). The labor participation of women was 70% in 2009 (Aas et al., 2013). The effect of being unemployed is complex and multifaceted and has different effects depending on the age group and region. Younger respondents show stronger effects on mortality and physical and subclinical mental morbidity, while the effect

in regions with high unemployment rates are lower (Berkman et al., 2000). Not only monetary benefits that might have immediate physical impacts through economic hardship but also psychological aspects that determine well-being are not met. Being unemployed means losing control, the opportunity to use skills, automatic interpersonal contact to improve communication and organizational abilities, external goal and task demands, variety and social position, which leads to an increase in depressive symptoms, lower self-confidence and higher externality; the feeling of loss of control. The protective effect of working through financial and social security against the impact of falling ill is lost. This is correlated with lower health and a higher rate of co morbidities. On the other hand, losing a job might also mean not being exposed to toxic environmental exposures, work stress or work specific risks. The effects seem to be reversible upon reemployment (Berkman et al., 2000).

The other major transition, retirement, seems to not have a negative impact on physical and mental health although bad health leads to early or involuntary retirement (Berkman et al., 2000). On the contrary, retiring seems to have a positive effect on well-being and mental health but not necessarily on physical health (Johnston & Lee, 2009).

Work is also a part of people's social network and can therefore increase well-being. Unemployed people need to increase their efforts to form networks elsewhere, which they might find especially difficult if they suffer from depression and other mental symptoms that make it more difficult for them to relate to others. On the other hand, they have been shown to benefit most from improving their social networks. Forming networks, building friendships and spreading health-related information and healthy behaviors is especially supported by non-hierarchical structures as present in most Norwegian companies and organizations (Yamamura, 2011).

3.2 Social Capital

There has been an increasing interest in investigating social capital as one of the main components of social determinants of health. It has been recognized to determine economic outcomes (Rocco et al., 2013) like economic growth and socioeconomic outcomes and is increasingly considered in health policy research (Yamamura, 2011). Besides more economically oriented measures in SES, social factors like engagement in civil societies and social support are important to capture different aspects of the concept of social determinants (Jusot et al.,

2008) that may be associated with different intermediate risk factors (Backlund et al., 1999). Social capital is a distinct concept from SES since people can benefit from it irrespective of their SES. Less educated people have been found to benefit more from higher social capital (Aas et al, 2013) and for married women, the benefits from working outside of home seem to be greater (Denton & Walters, 1999).

Social capital refers to resources of individuals or groups within a social organization that facilitate cooperation in networks, collective coordinated action and the maintenance of norms for mutual benefit (Baron-Epel et al., 2008). People are bonded to society through regulation and attachment to others, social capital refers to the latter and may provide material and non-material resources (Berkman et al., 2000). It can also be seen as a social product or feature and an individual response.

Social capital is conceptualized as a community or an individual level attribute, the different levels interact and influences cannot be clearly entangled but it can be measured on both levels. Individual social capital is considered a strong determinant of health while community social capital plays a smaller role (Rocco et al., 2013). I focus on individual level social capital. Variables to measure social capital vary across studies but it has been argued that all dimensions of social capital are important for health (Baron-Epel et al., 2008).

In health research the assumption is that the nature of relationship and the connectedness of an individual in a community are important for health and well-being for the individual and the population as a whole. Social isolation is a main chronic stressor and therefore affects overall mortality, morbidity (Berkman et al., 2000) and survival after breast cancer diagnosis in a magnitude comparable to that of well-known risk factors like smoking (Aas et al., 2013). Researchers are interested in the association between social capital and health, health care utilization and health behaviors (Ronconi et al., 2012). Especially in modern societies of industrialized countries, the quantity and quality of social relationships reduces so that social capital could be considered as a main predictor for health outcomes (Holt-Lunstad et al., 2010). Although not undebated, research generally confirms this association but could not find a causal relationship (Rocco et al., 2013). Several theories have been developed on how individual level social relationships through integration and cohesion influence health, for an overview see Berkman et al., 2000, p. 138. They argue that the positive effects result from social resources and support through psychological mechanisms in providing mental support and maintaining access to services and facilities (Rocco et al., 2013). Social capital is consid-

ered a subset of social cohesion that is defined differently across disciplines (Giordano & Lindstrom, 2010). It is considered to be high in Norwegian society (Aas et al., 2013).

Social capital has several dimensions that interact. For example, social participation is highly dependent on and influences the ability to trust, although the magnitude of the effect is still under debate. It is important to consider the quantity and quality of social participation that influences the ability to build up interpersonal trust (Giordano & Lindstrom, 2010). One can differentiate between cognitive components referring to norms, values, attitudes and beliefs and structural, observable components like membership in organizations and participation in informal networks (Iversen, 2008). The structural component facilitates making connections by lowering transaction costs. The cognitive component predisposes people to make connections (Ronconi et al., 2012). Further, a distinction is made between bonding capital that benefits the participants in a network like a family or organization and bridging capital that creates benefits beyond the particular network (Iversen, 2008). The main indicators used in health research are levels of social trust, reciprocal exchanges, sense of belonging in informal networks and social and civic participation (Fujuwara & Kawachi, 2008).

Cross-country comparisons have so far failed to show associated results. On a community level, a positive effect of social capital on health could be found in a previous Norwegian study but it was not robust against the influence of SES variables, and the effect of social capital on health differs for subgroups defined by age, gender and SES (Denton & Walters, 1999) and between studies (Iversen, 2008). In a welfare state like Norway, the impact of structural social capital on a community level on health could be smaller than in other countries because access to healthcare is generally free and mostly organized by the state and less dependent on social capital (Iversen, 2008).There have been positive results for the association on a community level (Giordano & Lindstrom, 2010), but overall, they are conflicting (Kim et al., 2011). It has been argued that although social capital is a contextual phenomenon, it works through the individual level (Giordano & Lindstrom, 2010). Individuals will benefit from community social capital through bridging (Iversen, 2008).

On the individual level social capital is understood as the characteristics of an individual that enable him or her to access different levels of social capital based on the communities in which one resides (Baron-Epel et al., 2008). Structural social capital is measured for example with the number of informal networks formed by family, friends and work as well as sports, religious or other types of organizations. This mainly indicates the respondent's perception of

social capital of the respondent. One important cognitive measure that could not been included in this study is generalized trust (Rocco et al., 2013). All of them have been linked to physical and mental health outcomes as well as health behaviors. Although the nature and magnitude of the associations is still debated (Giordano & Lindstrom, 2010) there is growing evidence that social relationships explain patterns in health disparities (d'Hombres et al., 2010). Especially structural social capital shows positive correlations with health (Iversen, 2008). The suggested mechanisms are the easier availability of relevant information through more intense social interactions with community members, the impact on social norms enforced through community members that discourage bad behavior, an increase in informal health care services and their accessibility that might avoid out of pocket payment and the establishment of psychological support networks to reduce stress and mental problems (Scheffler & Brown, 2008). In the context of diseases, social support is seen as central for recovery, coping and a good quality of life (Wen et al., 2013). The effects might be confounded by personality and early childhood environment (Fujiwara & Kawachi, 2008) and more intense social relationships may also help to spread infectious diseases (Rocco et al., 2013) so that the associations appear to be very complex. Social capital is also linked to employment and education in determining access to job opportunities and for example creating a culture that supports and demands a high level of education.

One part of social capital are social networks that can be seen as determining the structure and characteristics of a society. Based on Berkman et al. (2000), network size or connectedness is examined by the patterns of relationships of an individual that might cut across traditional kinship, residential and class groups. Networks are mainly assumed to have social support functions, have influence on behavior and attitudes and access to informational resources and material goods which influence physical and mental health status, mainly on subclinical depressive symptoms. It mainly seems to operate through psychological pathways like self-efficacy and social integration and its influence on emotions, mood and perceived well-being. Support is transactional in benefiting both, the person giving and receiving it. Social support may be divided into emotional, instrumental in terms of getting help or assistance in kind, appraisal related to decision making and informational support. They are incorporated in a larger social and cultural context and norms. Types of social support seem to be different but equally important.

3.2.1 Measures of Social Networks

Most studies investigating social networks capture the number of close friends and relatives, marital status and affiliation or membership in religious and voluntary associations (Berkman et al., 2000). Contact with friends and family and participation in voluntary activities results in a sense of meaningfulness and interdependence. They are shown to predict health outcomes although the interpretation of what they actually measure is debated (Iversen, 2008).

3.2.1.1 Friends

Friends provide one of the most important aspects of social support. They essentially form the social network apart from the family that determines access to resources and provides support. Benefits increase as the size of the network increases. Although, cognitive or theoretically available support has to be distinguished from actually received or provided behavioral support (Berkman et al., 2000). Therefore, not only the number of friends but also the closeness of the relationship needs to be considered. Since people perceive friendship as different concepts clarification, is needed to only include those who will actually provide support if behavioral support is targeted.

3.2.1.2 Participation in organizations

Engagement in social, civic or religious organizations can provide a sense of value, belonging, coherence and identity through enabling a person to participate, be obligated and feel attached to a community. It also provides support per se in giving opportunities for companionship and sociability. Previous studies find it to be an independent predictor of short- and long term mortality (Bath, 2003), which might also be due to increased levels of activity induced by the engagement. So apart from a psychological dimension, it also affects physical functioning (Berkman et al., 2000). The results of studies describing an association with self-rated health are inconsistent (Yamamura, 2011). The membership in a certain group itself might also give access to job opportunities and high quality health care.

3.2.1.3 Living situation

More and more people of all ages in developed countries are living alone – without parents, spouses, a partner or children, and loneliness is becoming increasingly common (Holt-Lunstad et al., 2010). In adulthood, especially marriage and the consequent living with a part-

ner are a big part of social support (Berkman et al., 2000) and therefore improves the health status (Yamamura, 2011). For cancer patients, being married and having children increases the chances for survival but overall, marital status shows mixed results (Bjorner et al., 1996). Social capital within the family is an incentive to choose a healthier lifestyle (Iversen, 2008).

3.3 Risk adjustment

Studies showed that variables in an individual that cannot be changed significantly influence the perception of health. The reference group theory assumes that the respondent's assessment and expectations tend to reflect the norms of the group they consider themselves or wish to be part of. Self-rating may reflect the norms of certain groups based on gender, age, diseases or region of residence (Fillenbaum, 1979; Baron-Epel & Kaplan, 2001).The whole process is embedded in a cultural context with differences between countries, cultures and cohorts (Bjorner et al., 1996). The effects of gender, age and ethnicity on mortality seem to act through independent pathways (Franks et al., 2003). The vignette approach is used to account for those differences (French et al., 2012).

3.3.1.1 Age

Age shows a complex pattern of correlations. In general, health ratings decrease with age, but in very old people ratings increase again maybe due to response shift or because those with lower ratings have died already. As response to a health shock, elderly people experience larger economic losses (Wagstaff & Lindelow, 2013). With increasing age, the health status and ratings for physical function and role function decline (Franks et al., 2003); while levels of stress, psychological and social problems are highest for people between 30 and 49 (Denton & Walters, 1999). Mental health increases with higher age (Franks et al., 2003). Age is a powerful predictor of morbidity and therefore closely linked to the perception of health. It shows that older respondents report lower self-rated global health (Baron-Epel & Kaplan, 2001) and health ratings in general (Franks et al., 2012). Studies find higher levels of distress for younger than for older women as a response to breast cancer (Wen et al., 2013). Also the observed effect of retirement on mental health needs to be considered that is dependent on age.

3.3.1.2 Gender

Even in European countries, the life expectancy for men and women differs widely. Within countries, the life expectancy is related to SES and gender (Marmot et al., 2011). Analyses show clear gender differences for self-rated global health and mental health symptoms (Back & Lee, 2011). Gender differences are not found consistently across all European countries and studies report conflicting results (French et al., 2012) with overall leaning towards lower self-rated health for women (Baron-Epel et al., 2008, Fillenbaum, 1979, Fayers & Sprangers, 2002). This may reflect that women have a higher life expectancy but also higher morbidity rates for chronic, disabling and mental diseases or men may underreport psychological distress and other limitations (Franks et al., 2003). For the same level of self-rated health, women report a higher level of disease and disability, which also suggests a different reference for rating health between men and women (Benyamini et al., 2003). Differences have been observed in the predictors for men's and women's health (Denton & Walters, 1999). For women, structural social capital factors seem to be more important while health behaviors like smoking and alcohol consumptions are more important determinants for the health status of men. Furthermore, the predictive power of self-rated health on mortality has been stronger for men than for women and dependent on different dimensions of health (Bath, 2003, Benyamini et al., 2003).

3.3.1.3 Region

The region of residence has a strong influence on SES and on most health outcomes reflecting more than differences in specific individuals living there (Berkman et al., 2000). Resources and exposures are specific for and differ between areas which influences SES and health. Social conditions in the neighborhood are a strong source of stress buffer. Recent literature focuses on the relative deprivation of neighborhoods to those in the surrounding area (Pearson et al., 2013). By including region, unobserved differences related to supply and demand of health services and SES inequalities in terms of quality of care, travel time to the nearest hospital, community social capital, educational level and unemployment, are accounted for (Aas et al., 2013). Especially in highly specialized breast cancer care, the long distance to the nearest hospital in rural areas might be an additional burden for patients and their family.

Between-country comparisons show big differences but overall, there seem to be many similarities on how people evaluate their health. Comparisons show that respondents from some

countries tend to over- or underestimate their health state so that between countries comparisons are difficult. Nonetheless, SES is consistently shown to have an influence (Subramanian et al., 2010).

3.3.1.4 Ethnicity

The effect of ethnicity on health perception, morbidity and mortality has been researched widely (Ashing-Giwa et al., 2004). Researchers find overall worse ratings for new immigrants (Baron-Epel & Kaplan, 2001) and differences between countries and ethnic groups within one country that are not captured by self-rated health (Franks et al., 2003). This might be due to differences in information availability and accessibility that come with certain cultural beliefs, norms and values, language barriers or response styles (French et al., 2012). Different ethnicities have also been shown to particularly differ in their wealth in terms of accumulated assets where differences are much larger than between income. Also, economic returns on education in terms of income and occupation as well as accessible education differ markedly between ethnic groups (Berkman et al., 2000). Overall, the influence of cross-cultural differences is still uncertain but may explain inconsistencies between studies (Bath, 2003). Some authors argue that besides cultural differences, life history and personal circumstances as well as the historical background might be important (French et al., 2012). Information on ethnicity in studies is rarely included, especially outside of the US. This is also the case in this thesis. Though theoretically important, ethnicity cannot be included in the analyses.

4 Health Shocks

The presence of a disease itself presents a stressor or a constraint with negative physical and psychological effects. This effect appears suddenly with the diagnosis as a response to threatening, damaging or demanding life conditions. It leads to an extreme disturbance of biological and psychological functioning. These negative changes in health are referred to as health shocks (Sundmacher, 2012). There are different types of health shocks; I will refer to illness related health shocks here. In this thesis, I will investigate health shocks on the example of breast cancer as the most common type of cancer in women.

Health shocks trigger physical and emotional responses due to the threat of disabilities, dependency, death, loss of a body part or important physiological and role functioning. The reactions are highly individual and can be disturbed psychological affects, motor-behavioral disturbances, inadequate cognitive functioning and changes in the nervous system; that lead to reduced health (Wagstaff & Lindelow, 2013). Primary emotional responses or coping styles are anxiety, depressive affect and anger. This emotional crisis affects the patient and the family. The impact on costs in terms of extra spending and lost income through a health shock are considerable and might trigger coping strategies like reduced consumption. This affects wealthier households and welfare societies less (Wagstaff & Lindelow, 2013). Chronic stress induced through low SES influences the treatment outcomes through adherence, delays in treatment begin and coping styles (Miller et al., 1976).

Patients usually use a number of different coping strategies as a response to a health shock, for example denial, rationalization, intellectualization, suppression, bargaining, anger, depression or acceptance. Chosen strategies differ based on personality and stage of life and the patient moves between the stages (Miller et al., 1976).

Delay in diagnosis is still common and often explained with denial and defense mechanisms, fear, misconceptions, misinterpretations of symptoms and inadequate communication with the physician. Women from higher SES seem to be more aware of their bodily symptoms and more concerned about their health state, so that they are less likely to delay the treatment, which gives them higher chances of survival (Miller et al., 1976).

Health shocks have been found to lead to lower health ratings (García-Gómez, 2011). Diseases show a circular relationship between psychological distress and physical illness; SES influ-

ences both (Aneshensel et al., 1984). SES influences the onset and progression of disease through the structural distribution and availability of protective material, social and intellectual resources. The impact of the disease and its physical and mental consequences are expected to gradually diminish over time (Cooney et al., 2013). Although the proportion of cancer survivors bothered by mental health problems, studies show a reduction over time (Mello et al., 2012), there is evidence that even years after treatment with no signs of the disease, emotional distress remains (Inbar et al., 2013).

Although the presence of disease has a negative impact on health and health shocks are more prevalent among low SES groups, one could expect respondents with a disease developing more psychological resources since they make more effort to actively seek information and support from physicians, media, friends and family. Social support through emotional support and additional information can buffer the impact of stress (Taylor & Seeman, 1999) and increases productivity. Patients with severe illnesses like breast cancer could be expected to improve some aspects of social determinants. On the other hand, patients may also react with taking in as little information as possible as a defense and denial mechanism (Miller et al., 1976).

4.1 Breast Cancer

Breast cancer will be investigated based on the concept of health shocks. It is the most common form of cancer in women and one of the leading causes of death worldwide (Wen et al., 2013). In Norway, about 26% of all cancer cases of women were breast cancer cases in 2008 (Aas et al., 2013). It is a so called 'solid' cancer of carcinoma type. It can be malignant, which means it spreads throughout the body and forms metastases. This type of cancer has lower survival rates and needs to be detected earlier. Benign forms have a higher survival rate, although they might recur as well. Risk factors for cancer are family history and genetic factors; breast cancer often runs in families and is linked to some genetic markers. Age, environmental factors, geography, diet, viral infections and inflammatory diseases are other risk factors (Beers et al., 2003). The earlier treatment starts, the higher are the chances for survival. Therefore, screening is an important aspect of cancer prevention. Mammography screening is widely used and has been successful in decreasing the death rates in certain age groups, although there is still a discussion going on about the right screening strategy due to possible negative impacts.

The diagnosis of breast cancer is a stressful traumatic event for the patient and besides the physical impact of the disease and treatment, psychological and social problems related to stress, loss of function, stigmatization and fear, need to be considered (Miller et al., 1976). Finding out that one has cancer can trigger anxiety, depression, anger and guilt. Common co morbidities are mental disorders, especially anxiety and depression (Mello et al., 2012). They are related to sleep disturbance, loss of appetite, heightened expectancy of pain, poor adherence with recommended therapy, tumor progression and mortality (Mello et al., 2012). Therefore, the experienced distress might affect the treatment process and outcomes (Fox et al., 2013).

For treatment, cure is the optimal outcome, meaning that all traces of cancer can be eliminated. Breast cancer deeply affects a woman's physical and mental health and disrupts their quality of life (Inbar et al., 2013). Besides treating the symptoms, emotional and psychological challenges should be considered in the treatment process (Colby & Shifren, 2012) since the disease may result in physical, economic and employment problems, in familial and marital challenges and concerns with body image and sexuality (Ashing-Giwa et al., 2004). Interventions improving the physical health have a positive effect on quality of life scores and all-cause mortality (Patterson et al., 2011). To evaluate the quality of life of cancer patients is difficult but important (Coates et al., 1983) as a central aspect of their overall health (Ardebil et al., 2013). Quality of life measures are used to compare different treatments and an association with survival has been found (Coates et al., 1997). Self-rated health has been found to be the best predictor of survival from cancer (Fayers & Sprangers, 2002).

Diagnosis and treatment of breast cancer have improved significantly in the last years so that survival rates have increased, being close to 90% for benign breast cancer now (Cooney et al., 2013) with an 87.8% relative 5 years survival rate in Norway in 2008 (Aas et al., 2013). These rates vary from country to country but now there is an increasing population of women who have had treatment for breast cancer.

Research shows that socioeconomic factors influence the quality of life among BCS (Wen et al., 2013) and all-cause mortality in cancer patients is significantly related to socioeconomic factors (Kravdal, 2000). Jung et al. (2013) find differences in self-rated health status for BCS which differed according to socioeconomic and ethnic background. They argue that these differences are linked to social determinants prior to the disease and to side effects during and after the treatment.

4.1.1 Treatment

Treatment strategies are chosen according to the type and stage of the cancer. Its impact varies depending on the received interventions, the intensity, time of treatment and personal characteristics. Almost everyone who receives cancer treatment experiences side effects. Relieving these is an important part of the treatment (Beers et al., 2003). Common side effects of breast cancer treatment are fatigue, irritability, memory loss, decreased energy level and pain. Besides those, emotional side effects like anxiety, distress, fear of recurrence and overall reduced quality of life are common (Wen et al., 2013). About half of all cancer survivors meet criteria for depression or anxiety disorders (Mello et al., 2012). These can manifest at the time of diagnosis and persist until after the acute treatment phase if not treated.

Surgery is the most effective form of treatment. It usually is the only or primary strategy chosen if the tumor has not spread. In some instances, surgery is combined with other treatments (Beers et al., 2003). For breast cancer, surgery can be performed breast preserving or as mastectomy with the removal of one or both breasts. Another surgical intervention is the removal of lymph nodes only when the tumor has spread there.

In radiation therapy, a beam or field of intense energy focused on a certain area or organ of the body is used. It kills preferentially cells that divide rapidly. Cancer cells divide more often than normal cells and are therefore more likely to be killed. It plays a key role in treating early-stage breast cancer. However, radiation can damage normal tissue as well. It also poses a threat to ovaries. Side effects depend on how large the treated area is, the dose and the tumor's proximity to sensitive tissue. Radiation in the chest can cause damage to the overlying skin, cause irritation of the stomach and intestines which may result in nausea, lack of appetite and diarrhea (Beers et al., 2003).

In chemotherapy, drugs are used that put more harm to cancer cells than to normal cells. In breast cancer, it is used in combination with radiation therapy or surgery since it is not curative (Coates et al., 1987). It is used in advanced stage breast cancer to treat metastases. The combinations and doses of drugs used differ (Beers et al., 2003). All drugs also affect normal cells and therefore cause side effects in different magnitudes. Those commonly are nausea, vomiting, loss of appetite, weight loss, fatigue and low blood cell count that lead to anemia and risk of infections, as well as hair loss. When choosing chemotherapy, consideration of the

quality of life relative to the effect is especially important due to its side effects (Coates et al., 1983).

Another option is the long term treatment with medicines to stimulate the body's response against cancer, some showed positive effects for early stage breast cancer (Beers et al., 2003).

4.2 Chronic Disease

Chronic or non-communicable diseases are estimated to be present in about 18% of the Norwegian population (WHO, 2011). I will use this sub sample of the GP as a comparison group to the BCS to further investigate the effect of the presence of a disease. Like breast cancer, their combined physical and mental health effects usually have a negative impact on the overall quality of life (Bayliss et al., 2012). Those with chronic diseases report lower health more often (Baron-Epel & Kaplan, 2001), since functional disability is associated with poorer health ratings (French et al., 2012).

Some authors suggest that chronic diseases can be categorized as health shocks. The diagnosis of a chronic disease might be perceived as a health shock and cause stress reactions. It is usually followed by complex and more or less severe treatment plans. The diagnosis is linked to threats of disability and death as inevitable long term predictions.

Chronic diseases are mainly caused by the behavioral risk factors tobacco use, unhealthy diet, insufficient physical activity or harmful use of alcohol. Associated risk factors and health damaging behavior are more prevalent in low SES groups. Here, socioeconomic factors pose chronic stress on the patient that might manifest in the disease. This results in a higher prevalence of chronic diseases which in turn might lower the SES of patients. Overall, there is a clear association (Baron-Epel & Kaplan, 2001) but the causal direction between SES and chronic disease remains unclear.

On the other hand, they can be considered as different from breast cancer. The experienced threats are mostly not immediately endangering the patient's life and treatment is in general less aggressive. Contrary to breast cancer, the cause for the illness mainly lies within the patient's lifestyle. Both patient groups share the characteristic of having a severe disease but the underlying reasons and onsets are different which might trigger different health perceptions.

5 Research Question

The previous theoretical reflections lead up to the research question of the developed study. I will investigate if I can find associations between SES and health outcomes for the special case of BCS. I will perform a comparison between female BCS and a sample of the GP.

Do we observe the same association between socioeconomic status & self-rated global and mental health in breast cancer survivors as for the general population?

I expect an association in both groups, as suggested by the literature but I expect the influence of socioeconomic variables to be different for BCS due to their specific disease and treatment experiences. I will also consider social networks as an important related construct.

Furthermore I will investigate how different breast cancer treatment variables alternate the association. In the GP I will explore the impact of the presence of chronic diseases and compare it to the associations found for the BCS. The patterns for associations are expected to be complex and under the influence of many variables, which may also, apart from their independent effects, interact with each other (Denton & Walters, 1999).

6 Data

6.1 Data Collection

The data contains two cross sectional retrospective surveys. I choose them because they fit the intention of my research question best, are both collected in Norway and comparable with regard to time of data collection, number of observations and included variables.

The main group of interest are the BCS. Data for this group is retrieved from a postal survey collected by the Medical Faculty of the University of Oslo (Aas et al., 2013) in cooperation with the Norwegian Breast Cancer Association. In 2009, a questionnaire was sent out to 3000 female members of the Norwegian Breast Cancer Association aged 40 to 69 years. The response rate was 62 %. Due to incomplete answers, 1809 respondents are included in the analyses. These women have been diagnosed with and treated for breast cancer between 2000 and 2009.

Data for the comparison group, the GP is based on the Norwegian "Survey on living conditions, health, care and social contact 2012" from Statistics Norway, available through the Norwegian Social Science Data Services (NSD). The survey is conducted every three years. 10 000 people, randomly selected from the Norwegian population according to their region of residence, aged 16 years and older were invited to participate. The response rate was 58 %. From originally 5660 observations I select a sub sample of women in the same age group as the BCS (40 to 69 years). This sample includes 1435 observations.

6.2 Variables

6.2.1 Health Outcomes

6.2.1.1 Global self-rated health

The question on global self-rated health is formulated in similar ways in the two questionnaires: "How do you experience your current health status?". The response options are equal on a five point Likert scale with two negative, two positive and a neutral option on a scale from 1 to 5 (1=very good, 2=good, 3=neither good nor bad, 4=bad and 5=very bad). For fur-

ther analysis I recode the variable into binary with “bad” including very bad, bad and neither good nor bad and “good” indicating very good or good health. The threshold is tested in sensitivity analyses.

6.2.1.2 Mental health

Mental health is captured by asking five questions covering different dimensions of mental health problems. The five items used are “fearful or anxious”, “nervous or inner unrest”, “feeling of hopelessness with regards to the future”, “depression or melancholy” and “much worried or upset”. Respondents are asked to report how much they were bothered by these symptoms in the last two weeks. The four response options are: 1=not bothered, 2=some bothered, 3=pretty much bothered, 4=very much bothered. To include all mental health symptoms as one dependent variable the responses for all questions are summed up. This creates a scale with a range from 5 to 20 with 5= being not bothered by any mental health problems until 20= being very much bothered by all symptoms. I then create binary variables with a threshold of 7 for further analyses, indicating those who are mainly not bothered. It is coded as “yes” = under threshold with a sum of five to seven and “no” = above threshold with a sum of eight to twenty. The threshold is tested in sensitivity analyses.

6.2.2 Socioeconomic Status

6.2.2.1 Income

For BCS a question on personal annual gross income at the point of diagnosis is included in the survey. It is aggregated in five groups: “less than NOK 100 000”, “NOK 100 000 to 199 999”, NOK “200 000 to 399 999”, “NOK 400 000 to 599 999”, “NOK 600 000 or more”. The survey on living conditions includes a question regarding financial problems: “in the last 12 months, did you experience severe financial problems?”. Consequently, the analysis for BCS focuses on the direct effect of income, while experienced economic hardship is considered in the GP.

6.2.2.2 Education

The highest level of education is measured on different scales in the two surveys. In the survey on living conditions education is presented on a nine point scale that is based on the offi-

cial reporting system for education in Norway (Statistisk sentralbyrå, 2001). This nine point scale is merged into four groups identical to the groups used in the BCS survey. The four categories are: ”middle school” (10 years), ”high school” (13 years), “university for less than four years” (14 to17 years) and “university for more than four years” (17 years or more).

6.2.2.3 Employment status

The assessment of employment status differs between the surveys. For the BCS I use a variable to assess if respondents are currently working for more than 10 hours per week. In the survey on living conditions several questions about employment status are included. I decide to use the question: “in the week before this survey, did you work in an income generating employment?”. Those on sick leave are categorized as working in both groups.

6.2.3 Social Network

The number of friends is one of the questions in the breast cancer survey, while the survey on living conditions includes the question: “how many people are you so close to that you can count on them if you have major personal problems?”. I merge the continuous numbers of the breast cancer survey in groups similar to those in the survey on living conditions: “0 to 2 friends”, “3 or 4 friends” and “5 and more friends”.

To assess participation in organizations, the survey for BCS includes a question about the number of memberships in organizations like associations, teams, groups and churches. The survey on living conditions includes several items on social network. I decide to use the question: “Do you meet others to pursue shared hobbies or interests?”. I create a binary variable for both groups, determining if respondents engage in organizations or not.

If respondents live together with a partner is included as a question in both questionnaires.

6.2.4 Risk Adjustment

Respondents are between 40 and 69 years old. I code it in three categories (“40 to 49 years”, “50 to 59 years” and “60 to 69 years”).

The survey for BCS contains information about the county while the survey on living conditions only has information about the region of origin. Information on counties and regions are

redefined into five areas: "Akershus and Oslo", "Østlandet and Sørlandet", "Vestlandet", "Midt-Norge" and "Nord-Norge".

6.2.5 Disease Variables

6.2.5.1 Breast cancer treatment

To further investigate the impact of breast cancer treatment, I include respondents' replies to related questions. The questionnaire includes questions on the time since diagnosis in years, if metastases are present, if rehabilitation of any form included in the questionnaire has been received and which types of treatment have been received. Included treatment strategies are: "surgical removal of breast", "breast preserving surgery", "removal of more than two lymph nodes", "radiation", "chemotherapy", "long term treatment with medicines" and "other treatment". To relate results to the severity of treatment, I compare those having received one type of surgery with those having received a complex treatment with surgery and chemotherapy.

6.2.5.2 Chronic diseases

The survey on living conditions includes the question if long term illnesses or disorders are present.

Table 1 - Overview of variables in the two groups. Proportion in category in valid percent, missing excluded; *= Mean

Classification	Category	Included Variable	Categories	Percent BCS	Percent GP
Health outcomes	Global self-rated health	*Binary global self-rated health*	Good	61.5	75.2
			Bad	38.5	24.8
			Missing	2.0	0.1
	Mental health 5 symptoms	*Bothered by mental health problems threshold 7*	Not bothered	60.0	76.0
			Bothered	40.0	24.0
			Missing	12.3	23.9
Socioeconomic status	Income	*Annual gross income at point of diagnosis (in NOK 100 000)*	Less than 1	4.4	
			1 to 1.999	17.7	
			2 to 3.999	60.0	
			4 to 5.999	15.0	
			6 or more	3.2	
			Missing	2.6	
		Financial problems	Yes		4.6
			No		95.4
			Missing		23.6

	Education	*Highest level of education*	Middle school	22.7	16.3
			High school	31.8	43.2
			University up to 4 years	28.7	33.1
			University more than 4 years	16.5	7.3
			Missing	1.1	0.6
	Employment status	*Working at point of survey*	Yes	83.0	68.3
			No	17.0	31.7
			Missing	0.3	0
Social network	Friends	*Number of friends*	0 to 2	6.5	5.3
			3 or 4	26.7	38.7
			5 or more	66.7	55.9
			Missing	2.9	0.8
	Organizations	*Participation in organizations*	Yes	68.4	77.6
			No	31.6	22.4
			Missing	2.4	0.3
	Living situation	*Living with a partner*	Yes	85.9	74.8
			No	14.1	25.2
			Missing	0.7	0
Risk adjustment	Age	*Age at point of survey*	40 to 49 years	19.3	33
			50 to 59 years	43.5	36.2
			60 to 69 years	36.9	30.8
			Missing	0.3	0
	Region of residence	*Region of residence at point of survey*	Oslo &Akershus	25.4	23.7
			Øst- & Sørlandet	29.8	28.6
			Vestlandet	25.2	30.0
			Midt Norge	6.8	8.1
			Nord Norge	12.8	9.5
			Missing	0.3	0
Disease variables	Breast cancer treatment	*Time since diagnosis*	Years	4.3*	
			Missing	0	
		Presence of metastases	Yes	5.4	
			No	93.6	
			Missing	1	
		Received type of treatment	Surgical breast removal	54.8	
			Breast preserving surgery	52.7	
			Lymph nodes removed	55.6	
			Chemotherapy	55.0	
			Radiation	76.0	
			Long-term medication	50.4	
			Other treatment	11.3	
			Missing	0	
		Received rehabilitation	Yes	79.9	
			No	20.3	
			Missing	0	
	Chronic disease	*Presence of chronic disease*	Yes		47.1
			No		52.9
			Missing		0.1

7 Methods

All statistical analyses are performed using SPSS Version 21. For graphs and some further exploration I use Microsoft Excel.

To compare the characteristics between the two groups I use cross tables and Pearson Chi-square (Chi^2) tests to test for proportions in two independent groups (Newbold et al., 2013; p. 606) since all the variables used for comparison are defined as binary or categorical.

To find associatons, I perfom both unadjusted simple and adjusted multiple regression analyses. I used binary logistic regressions in analyses for global and mental health. As sensitivity analyses I change the thresholds discriminating health states (Appendix 5). The assumptions for binary logistic regressions are: independence of the independent variables to avoid co linearity and a linear relationship between independent variables and the logit of the dependent variable. To check for this assumption I perform Pearson correlations. The model for the logistic regression is

$$logit\ (p_i) = \log(\frac{p_i}{1-p_i}) = \beta_0 + \beta_1 x_{1,i} + \beta_2 x_{2,i} + \cdots + \beta_m x_{m,i} \text{ for } i = 1 \dots n$$

(Subramanian et al., 2010)

It describes the log odds of an individual reporting good health or no mental health problems with β_0 as the log odds of reporting good health for the reference group. βX represents the change in the log odds of reporting good health or no mental health problems for a one unit change in the independent variables. The interpretation is presented in exponentiated logits, odds ratios with 95% confidence intervals, with 1 indicating no difference in odds between the groups. Significance levels are based on a two-tailed Wald test. The explanatory power of the models is shown by Omnibus Chi^2, -2 Log likelihood and Nagelkerke R^2 , a Pseudo R^2.

First, I build a model including the risk adjustment variables age and region to assess their impact. Since all variables are ex ante important for the association, I add all socioeconomic variables in my main model. First individually and then combined in a comparison between the GP and the BCS group. Furthermore I set up prediction models for the likelihood to be in good global health and not bothered by mental health problems, based on social determinants. For further exploration I add disease and treatment variables for both groups seperately.

8 Results

The goal of my analysis is to explore differences between the breast cancer survivor group and the GP in effects of being exposed to a high or low SES on general and mental health perception.

8.1 Group Differences

First, I want to investigate differences between the two groups. Tests for significance are based on a Pearson Chi^2 test.

8.1.1 Health Outcomes

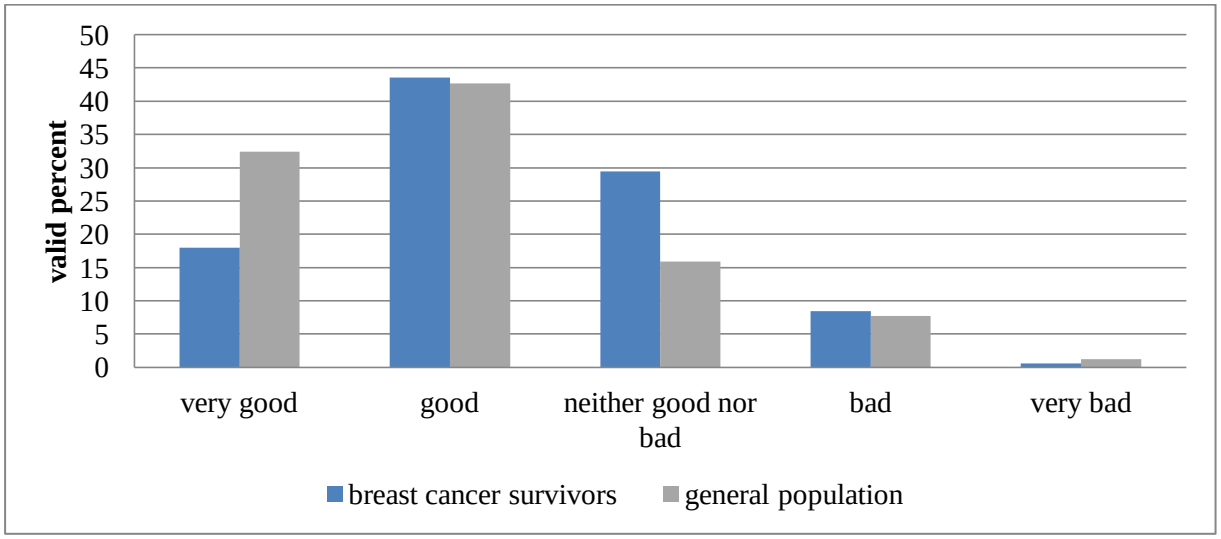

Figure 1 - Unadjusted global self-rated health in response categories

The percentage of those reporting good health is significantly higher for the GP (p=.000). It can be observed (Figure 1) that more respondents in the GP report very good health, while more BCS report neutral health. Slightly more BCS report good but also bad health. Very bad health is reported more frequently by respondents of the GP.

A high number of respondents in both groups are not bothered by any mental health problems with a sum of 5: 48.4% in the GP group and 35.4% in the BCS group (Figure 2). The median for all mental health dimensions is "not bothered". Nonetheless, the proportion of respondents in the BCS group who report to be bothered by mental health problems based on a threshold of 7 is significantly higher (p=.000).

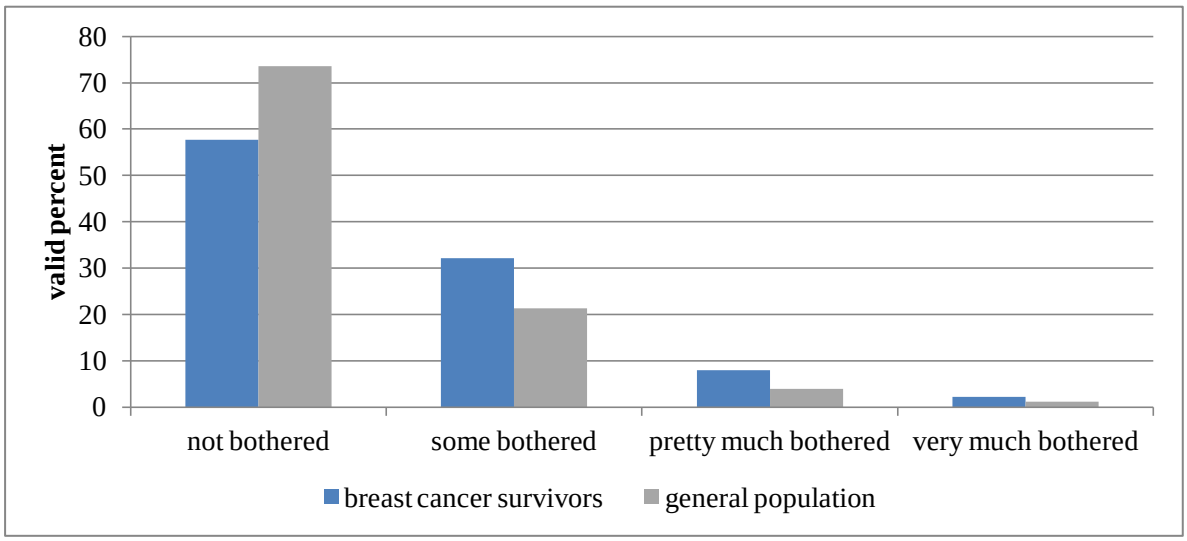

Figure 2 - Unadjusted average responses for the five mental health dimensions in the five response categories

When stratified by age (Figure 3), the proportion of respondents in positive health states is lower for BCS across all age groups. In global health, the BCS show a stable proportion in good health (60.8%, 60% and 63.9%), while the proportion in the GP constantly decreases with age (80.5%, 76.4% and 67.9%). Differences between the groups reduce with increasing age. The trend in mental health is similar in both groups with slightly more respondents in good mental health for higher age groups.

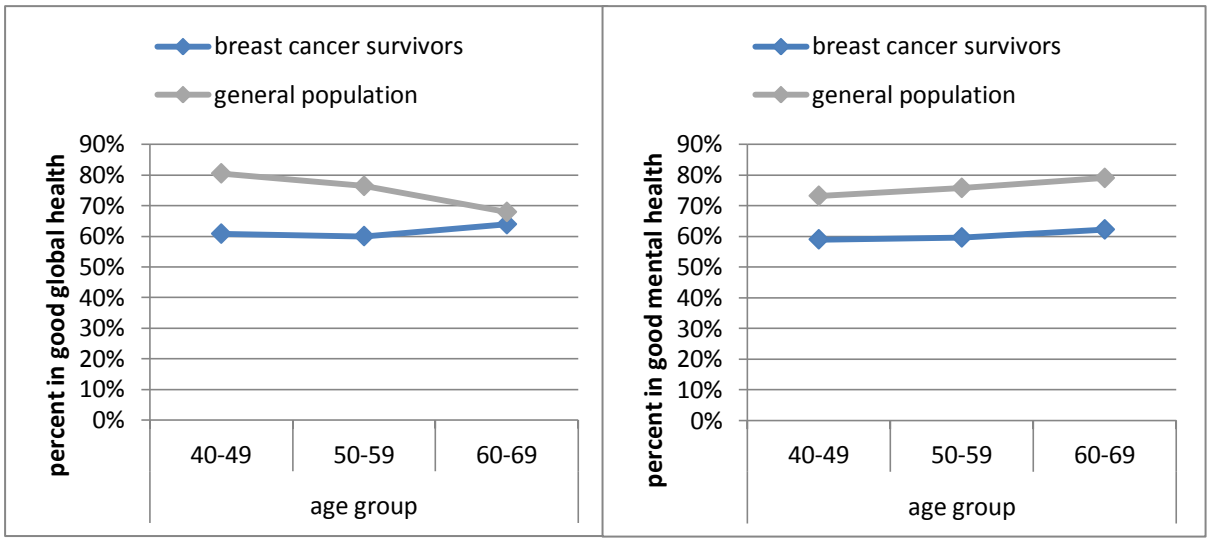

Figure 3 - Proportion in positive health states stratified by age groups

8.1.2 Socioeconomic Status

For BCS, the median for personal income is 3 with a mean of 2.95, indicating an average income between NOK 200 000 and 399 999. In the GP, 4.6% report financial problems.

Most respondents' highest level of education is high school. The level of education in the two groups differs significantly (p=.000). The median in both groups is 2, the mean for BCS is slightly higher (2.39 versus 2.31) but differences between groups vary along the continuum. More BCS went to university (45.2% versus 40.4%) and at the same time more BCS left schooling after middle school (23% versus 16.4%).

Significantly more respondents from the GP are working (p=.000). It might be due to the limitations BCS experience from their disease in physical or social health or due to the age distribution in the two groups. More BCS are likely to be retired, since they are above 60: 30.8% in the GP versus 37% in the BCS group.

8.1.3 Social Network

Everyone in the GP reports at least one person that may help with problems, while 1% of the BCS reports to not have a friend. The difference between the groups reporting zero to two friends is nonetheless not statistically significant. Significantly more respondents of the GP report having three or four friends while the proportion of respondents having five or more friends is significantly bigger among the BCS. BCS do an average report slightly more friends: group 2.59 versus 2.51 for the GP with a median of group 3 (5 or more friends) for both groups.

The number of people participating in organizations in the BCS group is significantly lower (p=.000) than those reporting to meet others for shared hobbies and interests in the GP.

Significantly more BCS report living with a partner (p=.000).

8.1.4 Risk Adjustment

When risk adjusting for age and region, I find that the BCS are on average significantly older: 54.26 years for the GP versus 56.4 years for the BCS (p=.000). For region of residence, sig-

nificantly more BCS come from Nord-Norge and significantly less from Vestlandet. For other regions, the differences are not significant.

8.2 Association Social Determinants and Health

To check for the assumption of co linearity between independent variables I start with correlations (Appendix 3). Both groups show significant correlations between SES, social network, treatment and disease variables and age. Nonetheless, the danger of co linearity is low since correlations do not exceed 0.9, so that all variables can be included in the regression models. Correlations with health outcomes show that most SES and social network variables are correlated with general and mental health in the GP group but not for the BCS.

In regression analyses I first determine the impact of the risk adjustment variables age and region (Appendix 4). For global health, the model shows significant positive effects of age for the GP but not for the BCS. Being younger increases the probability of reporting good health. Regions do not have a significant effect in both groups. In mental health, no variable gets significant on 5% level. The models with age and region show very low explanatory power in both groups.

Adding SES and social network variables improves the explanatory power for both groups with a higher Nagelkerke R^2 and a lower -2 Log likelihood compared to the first model (Table 2). Results show that this model does explain 26.2% of the variation in global health for the GP but only 1.8% for the BCS. This is also confirmed by the Omnibus Chi^2 value that is highly significant for the GP but not significant for the BCS, indicating that adding SES variables does not significantly increase the explanatory power of the model.

For global health in the BCS group, the lowest level of education shows a significant effect that also holds in the adjusted model, indicating that a lower level of education is associated with better health ratings. Income shows a partly significant effect suggesting that higher income is associated with better health ratings. Employment stays non-significant. For the GP, financial problems have a strong negative effect on global health that also holds when adjusted for the other SES variables. A higher educational level shows a higher probability of reporting good health. Being employed has a strong positive effect on the probability to report good health even in the adjusted model. Of social network variables, only participating in organizations shows a positive effect.

As for global health, the explanatory power of the models on mental health with a threshold of 7 (Table 3) is lower for BCS than the one for GP. Overall, the explanatory power for mental health is about 10% lower than for global health in both groups.

For BCS, Omnibus Chi^2 is not significant and no significant independent variables can be found for mental health. In the GP, SES variables show significant ORs. Educational levels show a positive effect compared to the highest level of education. Respondents in lower educational levels have a higher probability of not reporting mental health problems in the adjusted model. Furthermore, being employed and not reporting financial problems show a significant positive effect. Of social network variables, only the number of friends shows a significant effect on a 5 % significance level. Age stays a significant variable for the GP; older respondents are more likely to report positive mental health.

Sensitivity analyses in general confirm the findings and show robust results (Appendix 5). For BCS, the explanatory power of the models consistently stays low with non-significant Omnibus Chi^2 values. Employment status and low income confirm a significant effect for global health with a low threshold. When only "very good" is determined as positive health state, none of the variables shows a significant effect. Education becomes a significant factor for those entirely without mental health problems (threshold 5). Lower levels of education are associated with a lower probability of reporting mental health problems. For all other mental health thresholds, no variables became significant on 5 % significance level. Social network variables consistently stay non-significant for BCS.

In sensitivity analyses for the GP, the explanatory power of the models stays high with significant Omnibus Chi^2 values. SES variables show a robust influence on global health with a low threshold. For a high threshold, all are significant in unadjusted models but only employment has a significant positive effect in the adjusted model. In mental health, the level of education is only significant for high thresholds (5 and 7); financial problems and employment consistently stay significant. Of all social network variables, only the participation in organizations gets significant. Participating in organizations shows a positive effect for a low threshold in global health and all mental health thresholds.

Table 2 - Logistic regression results in Odds Ratios (OR) for global self-rated health with 95% Confidence intervals below. Significance levels: *<0.1, **<0.05, *<0.01, ****<0.001. Unadjusted OR derived from simple regressions and adjusted OR from multiple regressions with all variables**

Variable	Categories	Breast Cancer Survivors		General Population	
		Unadj. OR	Adjusted OR	Unadj. OR	Adjusted OR
Income (in NOK 100 000) *Reference group: 2 to 3.999 No financial problems*	Less than 1	1.06 (0.65;1.71)	0.84 (0.49;1.44)		
	1 to 1.999	0.91 (0.70;1.18)	0.77* (0.57;1.03)		
	4 to 5.999	1.21 (0.91;1.45)	1.42** (1.04;1.95)		
	6 or more	0.81 (0.46;1.45)	0.82 (0.44;1.51)		
	Financial problems			0.19**** (0.11;0.34)	0.25**** (0.12;0.50)
Education *Reference group: University more than 4 years*	Middle school	1.36* (0.99;1.89)	1.62** (1.12;2.34)	0.38**** (0.29;0.52)	0.29*** (0.11;0.69)
	High school	0.97 (0.73;1.31)	1.13 (0.82;1.57)	0.87 (0.68;1.11)	0.43** (0.19;0.98)
	University up to 4 years	1.01 (0.75;1.36)	1.02 (0.80;1.51)	2.07**** (1.56;2.76)	0.58 (0.25;1.36)
Employment status *Reference group: Not working*	Working at point of survey	1.14 (0.92;1.41)	0.77 (0.56;1.06)	6.45**** (4.84;8.59)	6.02**** (4.20;8.63)
Number of friends *Reference group: 5 or more*	0 to 2	0.89 (0.67;1.18)	1.06 (0.69;1.62)	0.70 (0.43;1.16)	1.21 (0.60;2.47)
	3 or 4	1.01 (0.81;1.26)	1.00 (0.79;1.26)	0.81 (0.63;1.04)	1.11 (0.79;1.56)
Participation in organizations *Reference group: Not participating*	Participation in organizations	1.14 (0.92;1.41)	1.13 (0.91;1.41)	2.38**** (1.81;3.11)	2.43**** (1.69;3.50)
Living situation *Reference group: Not with a partner*	Living with a partner	0.89 (0.67;1.18)	0.91 (0.67;1.23)	1.22 (0.92;1.60)	0.85 (0.58;1.24)
Omnibus Chi^2			21.72		204.94****
-2 Log likelihood			2138.92		956.13
Nagelkerke R^2			.018		.262

Table 3 - Logistic regression results in Odds Ratios (OR) for mental health with 95% Confidence intervals below. Significance levels: *<0.1, **<0.05, *<0.01, ****<0.001. Unadjusted OR derived from simple regressions and adjusted OR from multiple regressions with all variables**

Variable	Categories	Breast Cancer Survivors		General Population	
		Unadj. OR	Adjusted OR	Unadj. OR	Adjusted OR
Income (in NOK 100 000) *Reference group: 2 to 3.999 No financial problems*	Less than 1	0.75 (0.45;1.25)	0.56 (0.23;1.38)		
	1 to 1.999	0.98 (0.74;1.29)	0.73 (0.34;1.55)		
	4 to 5.999	1.04 (0.77;1.40)	0.72 (0.36;1.45)		
	6 or more	1.39 (0.72;2.68)	0.76 (0.37;1.55)		
	Financial problems			0.12**** (0.07;0.23)	0.13**** (0.06;0.26)
Education *Reference group: University more than 4 years*	Middle school	0.91 (0.65;1.28)	0.89 (0.61;1.31)	0.81 (0.55;1.19)	2.41** (1.24;4.71)
	High school	0.83 (0.61;1.14)	0.87 (0.62;1.22)	1.02 (0.76;1.35)	2.02** (1.14;3.58)
	University up to 4 years	0.88 (0.64;1.20)	0.92 (0.66;1.28)	1.28 (0.94;1.79)	1.93** (1.09;3.43)
Employment status *Reference group: Not working*	Working at point of survey	1.09 (0.83;1.44)	0.93 (0.67;1.31)	3.33**** (2.40;4.63)	2.98**** (2.10;4.24)
Number of friends *Reference group: 5 or more*	0 to 2	0.92 (0.61;1.40)	0.98 (0.63;1.52)	0.39*** (0.22;0.70)	0.45** (0.23;0.87)
	3 or 4	1.00 (0.79;1.27)	1.01 (0.79;1.28)	0.69** (0.51;0.91)	0.65** (048;0.90)
Participation in organizations *Reference group: Not participating*	Participation in organizations	1.17 (0.94;1.46)	1.10 (0.87;1.39)	1.60*** (1.16;2.21)	1.43* (1.00;2.06)
Living situation *Reference group: Not with a partner*	Living with a partner	1.15 (0.85;1.54)	1.11 (0.81;1.51)	1.44** (1.05;1.97)	1.12 (0.79;1.59)
Omnibus Chi^2			8.49		125.18****
-2 Log likelihood			1947.12		1054.00
Nagelkerke R^2			.008		.166

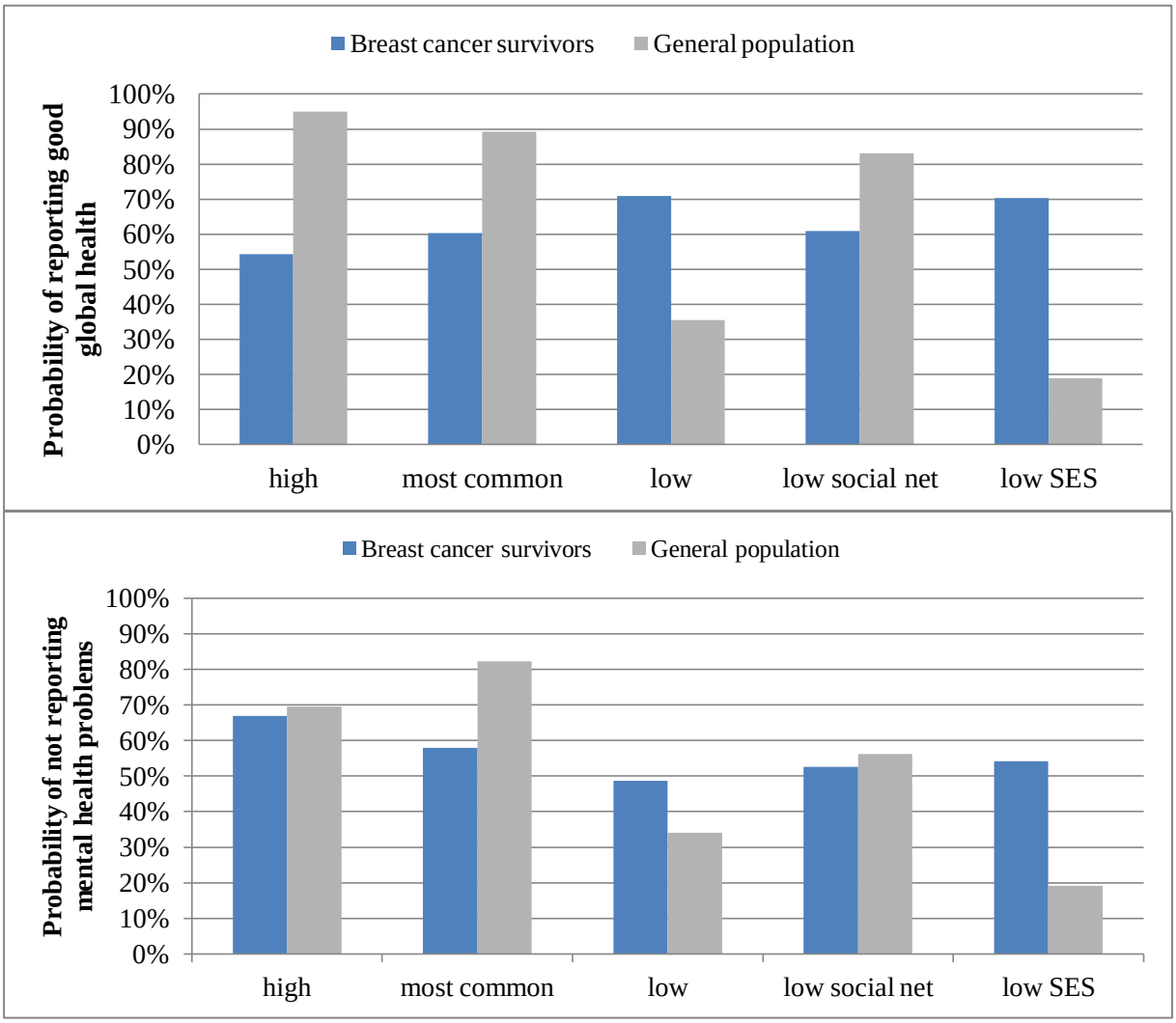

Figure 4 - Predicted probability of reporting good global health/ no mental health problems.

All groups in age group 50-59 and region Øst- & Sørlandet.
High: income NOK 600 000 or more/ no financial problems, university more than 4 years, working, 5 or more friends, participating in organizations, living with a partner.
Most common: income NOK 200 000 to 399 999/ no financial problems, high school, working, 5 or more friends, participating in organizations, living with a partner
Low: income less than NOK 100 000/ financial problems, middle school, not working, 0 to 2 friends, not participating in organizations, not living with a partner
Low social net: income, education, working as most common; 0 to 2 friends, not participating in organizations, not living with a partner
Low SES: income less than NOK 100 000/ financial problems, middle school, not working; friends, organization, partner as most common.

To assess the magnitude of the effect for SES variables, I calculate predictive probabilities (Figure 4) based on the correlation coefficients of logistic regression results. One can see that the probability of reporting positive health outcomes is lower for the average breast cancer survivor than for the average respondent of the GP. Variations between the different categories are stronger for the GP; the probability of reporting positive health outcomes remains much more stable for BCS.

The most positive combination of SES and social network is expected to have a positive effect on the probability of reporting good health compared to the average group. This can be observed for the GP in global health and for BCS in mental health. Those in the most positive state of the GP report good health with a 95% probability. However, a decrease is seen for the GP in mental health and for BCS in global health.

For low status values, probabilities are generally lower for the GP. Especially a low SES has a strong effect, while lower social network values have a weaker effect. For global health of BCS, an increase compared to the average observation is found for those with a combination of low values. A negative effect of low values can only be found for mental health. There is no difference between the sole impact of SES and social network.

Overall, SES has a strong impact on health outcomes for the GP while the association for BCS remains weaker. Higher income is expected to have a positive effect on self-rated global health outcomes, although the results for BCS are not constantly significant. For mental health, the average income seems to be linked to the most positive outcomes since all income groups show an OR smaller one. The experience of financial problems clearly deteriorates health in the GP. Employment has a robust positive impact in the GP. Values for BCS indicate a negative though non-significant influence of employment. Education shows varying results. For the GP, higher education is linked to better mental but worse global health outcomes. The opposite is observed for BCS, though only the lowest educational level in global health shows a significant effect.

8.3 Disease Variables

8.3.1 Breast Cancer Treatment

There are no significant differences on 5% significance level found in health outcomes and SES variables when stratified by the included variables time since diagnosis, presence of metastases, received rehabilitation and different types of treatment. When including the disease and treatment variables in the regression model (Appendix 6.1.3), the explanatory power increases slightly for global and mental health. Still Omnibus Chi^2 is not significant. For global health outcomes, disease variables do not get significant on a 5% significance level. In mental health, receiving complex treatment (surgery and chemotherapy) has a significant positive effect on health outcomes. For SES and social network variables, the direction and strength of influence stays the same in both dimensions. For further analyses on treatment variables, please see Appendix 6.1.

8.3.2 Chronic Disease

Chronic diseases are reported by 47.1% of the GP. There are significant differences for all global and mental health outcome variables for those with and without chronic diseases.

Respondents in the GP with chronic diseases report less frequently "very good" health than those without. Bad and very bad health is mostly reported by those with chronic diseases. Compared with BCS, those with chronic diseases report more positive global health. They also have a lower mental health status than the remaining GP but better than BCS (Figure 5).

The three groups differ significantly in their SES (Appendix 6.2.1). Those with a chronic disease are on average of lower SES than the remaining GP. When I compare this subsample of the GP with the BCS, I find that BCS are on average higher educated, report more friends, and are more likely to live with a partner but less likely to participate in organizations and to work. They are also on average older than those with chronic disease.

When including the presence of chronic disease in the logistic regression (Appendix 6.2.2) for the GP, the explanatory power increases. Those SES variables that are significant in previous models stay significant with the same direction and about the strength of their effect. The presence of chronic disease itself shows a significant negative effect, increasing the likelihood

of reporting negative health outcomes. This indicates that the presence of chronic disease is an important factor that explains variation in the perception of health but it does not confound or is confounded by other independent variables.

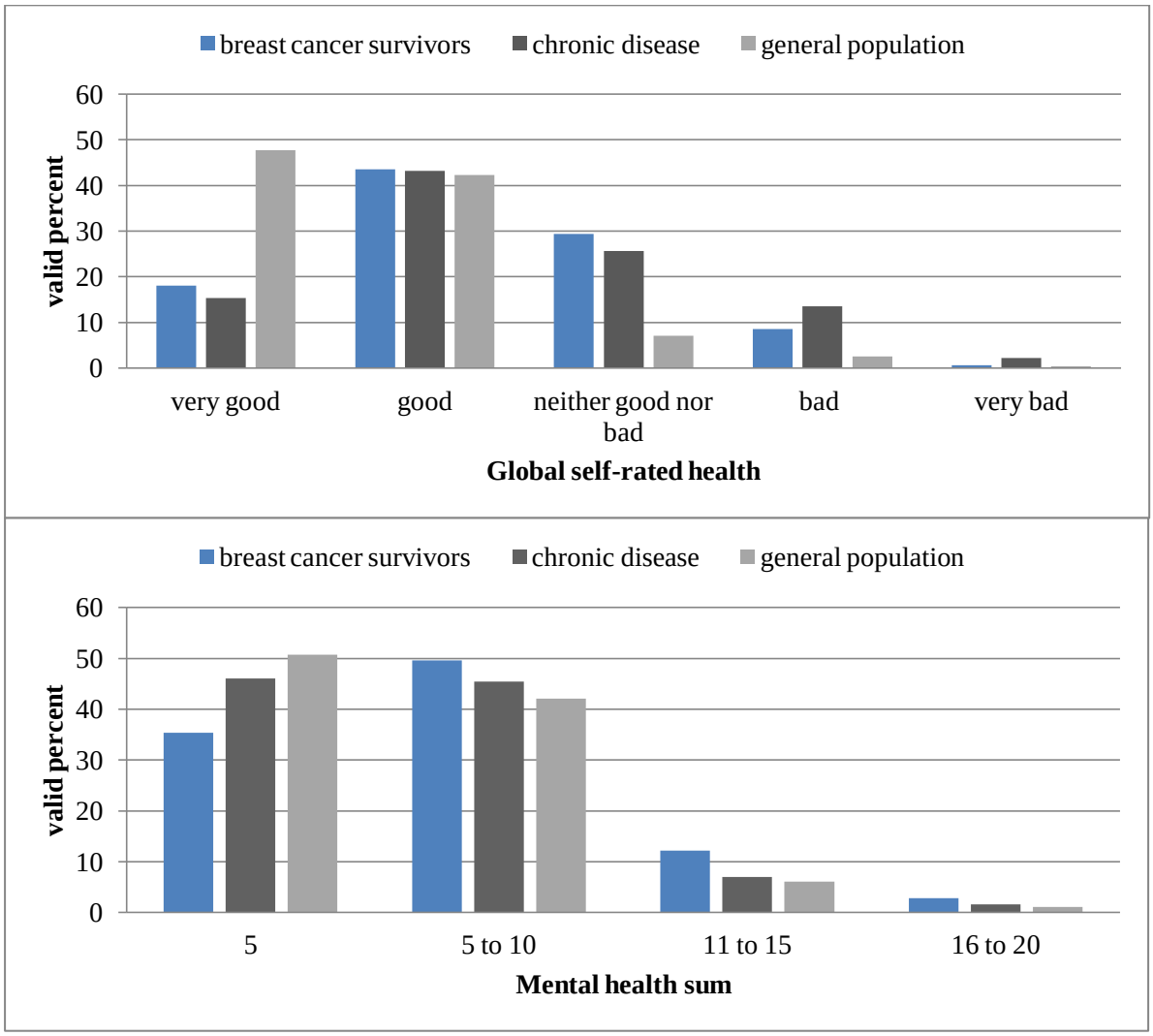

Figure 5 - Health outcomes for BCS and the general population stratified by the presence of chronic disease (general population= those of GP without chronic disease)

When building two different models for those with and without chronic diseases in the GP, differences can be observed (Appendix 6.2.2). In global health, financial problems are not significant for those without chronic diseases, while they are highly significant for those with a chronic disease. In mental health, education only shows a significant effect for those without chronic diseases. All other variables show the same effect as observed in the previous models (Tables 2&3). Some differences in social network variables can be observed. Overall, similarities are bigger than differences. So in contrast to findings of the BCS group, SES remains an important predictor for health outcomes when a chronic disease is present.

9 Discussion

Overall, all SES variables have a significant impact on the perception of global and mental health in the adjusted models for respondents from the GP. The increase in explanatory power is significant and beyond the expected growth through entering more variables in the model. Also the presence of chronic disease has an independent and robust impact. The direction of associations mainly follows previous literature, only education is observed to have a reverse effect on mental health. I can confirm an influence on self-rated health throughout all levels of SES with those in more advantaged SES reporting better health. The results for global self-rated and mental health are related but also showed differences in determining factors and direction of influences.

For the BCS group, SES variables cannot significantly improve the explanation of variation in general and mental health outcomes. Also adding treatment and disease variables does not significantly contribute to explaining the relationship. There is only a small improvement in explanatory power when adding SES variables and values stay lower than those for the GP. There are no significant values for mental health. In global health, significant influences of income and education are not found for the whole continuum and contrary to the GP significance levels do not exceed a 5% level. Sensitivity analyses in general confirmed these findings. Furthermore, the absolute predictive probabilities show strong variations for the GP and only moderate and not clearly directed influences of SES on self-rated health outcomes for BCS.

To answer my research question I can summarize that the association between SES and health for BCS differs from the association found in the GP. SES seems to be less influential in determining the self-rated health state of BCS. Nevertheless, the underlying causal relationship of the association can only be assumed based on previous literature. One possible explanation for the association is a differing underlying conceptualization of health based on SES as suggested by other authors (Franks et al., 2003). Alternatively, other unmeasured factors may contribute to the association. The study might have failed to show significant results because the sample size is not big enough to show the true effect. This might especially apply to income levels in the BCS group, with only few observations in extreme levels. To cover all pathways by which SES determines self-rated health, other factors like macroeconomic contexts, behavioral factors and biological predispositions and other medical data need to be in-

cluded (Adler & Ostrove, 1999). To validate self-rated health, results should be controlled for medical health investigations (Goldman et al., 2004). Exploration of all these factors is beyond this thesis.

Social network shows an influence for the GP but not for BCS. It has been suggested that BCS improve parts of their social capital to compensate for lower SES and because they do rely more on information and support. This seems to not be supported by the regressions and predictions.

It is important to point out that the presented results are not valid for the whole group of breast cancer patients, only for survivors. Interpretations need to be drawn carefully since not only do survivors differ from those who die of breast cancer; it can also be suspected that there is a complex interaction of biological, psychological and environmental factors to determine who develops breast cancer in the first place (Berkman et al., 2000; Coates et al., 1997). Their associations might have been different even before the disease. The literature suggests that the association between SES and self-rated health is mediated by health-related information seeking behavior. Cancer related information seeking has been shown to reduce side effects, increase compliance and self-confidence and increase social and cognitive functioning for survivors (Jung et al., 2013).

Survivors are significantly different in many aspects; socially isolated women have a higher probability of dying from breast cancer (Kroenke et al., 2006). Those who survive might not have been exposed to chronic stressors, those who survive might on average be of higher SES. This is not the case in this sample. Significant differences in SES variables between the groups might be due to specific characteristics and needs associated with breast cancer or due to social selection. It is known that survival is associated with SES (Miller et al., 1976).

It can be speculated that for breast cancer patients from low SES, survivors are different from those who die; they might have been especially healthy before. Self-rated health is strongly associated with survival so that those of lower health are likely to have died (Fayers & Hays, 2005). Another interpretation might be that mainly those patients survive whose health is not strongly influenced by SES. For them, true health differences can be expected to be the main determining factor for health ratings. As a response to surviving a health shock the perception, evaluation and valuation of health is likely to change. Patients learn to cope and change expectations so that they report positive health although their medical status remains unchanged

or decreases. The role of SES might disappear because they survive. Many people report a whole new appreciation of life and their abilities rather than focusing on fear of recurrence (Cancer Treatment Centers of America, 2014). This has been confirmed by vignette approaches; people without the experience of a health shock value health after a disease like breast cancer lower than survivors (Parry, 2007). This supports the hypothesis of a new conceptualization of health that might explain the observed differences between BCS and the GP.

Nevertheless, as suggested by previous literature the experience of a health shock even years after survival leads to reduced self-rated health although I cannot confirm a time dependent improvement in health state. Access and use of healthcare, social networks and socially determined behaviors have been suggested to moderate the social determination of health (Aas et al., 2013). It might be that entering the health care system through treatment leads to non-significant differences between SES groups since women of lower SES benefit more than others from healthcare interventions and therefore compensate for their low SES (Aas et al., 2013). In the presented data, complex treatment is associated with better mental health ratings. Receiving more services might increase the benefits from treatment. Through social experiences and opportunities patients might improve especially psychological aspects of their health.

The specific characteristics of breast cancer as a health shock seems to be associated with these relationships, the presence of a chronic disease is not sufficient to diminish associations; those with chronic diseases show a strong association of self-rated health outcomes with SES. So long-term diseases of chronic onset that are mainly caused by lifestyle related factors seem to be different from breast cancer and their classification as a health shock might be questioned. A bias here might be that co morbidities are not assessed in the BCS survey.

The strong influence of age on health ratings as emphasized by the literature can be found for the GP with less positive global health outcomes for older respondents. I can confirm a slight increase in mental health for BCS with age (Colby & Shifren, 2012) and also show it for global health, which might be due to an overestimation of the health state that is prominent among elderly (Fayers & Sprangers, 2002) or increasing appreciation of the remaining functional ability (Parry, 2007).

Nevertheless, conclusions have to be drawn carefully, due to some limitations of the study. Research has shown wide cross cultural differences in associations between SES and health

(d'Uva et al., 2008) so that the extrapolation to contexts outside of Norway should be done carefully. One problem in the data set are missing values, especially for mental health and financial problems which might question the robustness of results (Appendix 7).

For the five dimensions of mental health, 23.9% of the GP and 12.3% of the BCS do not answer all questions on mental health. I find those with missing answers in the GP group on average to be older and less educated. No significant differences can be found for the BCS group although age and education stay significant when groups are merged.

23.6% of the GP do not reply to the question on financial problems. This might lead to an underestimation of those in economic problems since they are more likely to not reply. They report significantly less good global health. When looking at mental health, 97% of those not responding to the question on financial problems do likewise not respond to questions concerning mental health completely. Overall, there seems to be a subsample with distinct characteristics that is not included in the analysis. Nonetheless, regression results for the GP are not significantly altered when financial problems are excluded.

Another limitation is based on the set up of the study in a cross-sectional design. It does not allow investigating the topic from a life course perspective that would be important to analyze the association in depth (Berkman et al., 2000). To optimally assess the complex association between SES and self-rated health, a longitudinal prospective design should be used. A large enough cohort of women, where some develop breast cancer would be followed with assessments of SES and self-rated health at several points in time before and after breast cancer diagnosis and treatment.

The used surveys are comparable in the time of data collection (2009 and 2012). This is important since SES, political and social living conditions change constantly over time. The survey on living conditions conducted in 2008 would have been closest in time but some variables are not covered as well as desirable for this study. Measurement error in the data collection could occur but is likely to be random. Both surveys are conducted in Norway so cultural differences as a confounder can be eliminated. Using these surveys allows me to get approximately the same number of observations in both groups of women in the same age group. Selection bias might take place since only those breast cancer patients who are member in the Norwegian Breast Cancer Association are included. Members of the association might be different with respect to health and SES variables. Some respondents to the survey might still be

undergoing treatment. Additionally, not all invited participants responded. The latter point is relevant for the survey on living conditions, whereas here a big effort is made to collect a nationally representative sample. Reporting bias might occur hence those in better health understand questions more positively.

The included variables allow drawing a detailed picture of individual SES. Combined with the big sample size, results are assumed to be reliable for the specific context. Problematic might be that most variables are assessed at the point of survey but others at the time of breast cancer diagnosis, values might have changed in the meantime. Nevertheless, the overall chronic impact of SES should remain relatively stable.

My outcome variables, global self-rated health and mental health are formulated in similar ways so that wording and scaling does not have an effect on the results. The wording is slightly different but the literature shows that there is no significant difference for diverse phrasing. Following current literature I use global health as a binary outcome variable with the neutral health state included as a negative health outcome since older adults tend to give negative events a neutral meaning (Benyamini et al., 2000). The response scale for global self-rated health is a balanced five-point Likert scale, which is a robust predictor of mortality and correlates strongly with other objective health indicators (Subramanian et al., 2010). It allows discriminating health states sufficiently.

In asking the question to assess global self-rated health, one assumes that there is a commonly accepted standard of health, internalized by the respondents. The same is true for the response options (Fillenbaum, 1979). Research shows that this standard or frame of reference differs widely between people even from the same cultural background and that reporting heterogeneity exists. Some respondents focus on specific health problems, others more on physical functioning or behavior (Fayers & Sprangers, 2002). Also the reference group differs; some compare themselves with their age group, others with their own health in an earlier point in time or with people with the same disease (Fayers & Hays, 2005). Different social groups can value and perceive their health differently (Subramanian et al., 2010). Response shift makes comparisons over time difficult to interpret; an improvement in health state may not be the true reason for a change. The group referred to changes under certain circumstances, for example severe diseases like breast cancer (Coates et al., 1997) so that self-ratings might reflect something different from what the GP evaluates in a new conceptualization of health. This makes the interpretation of differences between groups difficult to interpret.

Mental health is assessed in five dimensions that cover the most frequent common mental disorders except for fatigue. They are different (Appendix 2) but overall contribute to the concept of common mental disorders. Mental health is analyzed with a threshold of 7 that indicates that respondents can be considered to be in good mental health. They could be some bothered by maximum two symptoms or pretty much bothered by one symptom.

There are positive and negative factors influencing the self-rating of health. Models with only negative factors do not show a high explanatory power. It is therefore important to also include positive factors like social network. Negative factors are more associated with the poor to average range in answering scales while positive factors discriminate the average to excellent area (Benyamini et al., 2000). In performed sensitivity analyses the most positive health states are distinguished by positive factors like the number of friends or living with a partner, while economic aspects play the biggest role in determining lower health states.

To assess income, household income would have been the best option since the social status of a woman often depends on her husband's (Backlund et al., 1999). It is assessed in the breast cancer survivor survey but 19.8% do not report it. Individual and household income are not significantly correlated so I decide to use the one with more observations. Income is expected to be highly influenced by having a disease so I choose to use the income before diagnosis. In the survey on living conditions, income from the registry is not yet added so that I can only use data on reported financial problems. This might be problematic since people with high income but high expenses can experience financial problems as well as those with low income. Nonetheless, the experienced economic hardship presents a stressor and perceived constraint irrespective of the SES group. Since it shows strong associations it might even have been preferable in both groups. Income is understood as a resource to buffer social and economic stress, therefore overall wealth could be considered to completely assess the life course impact with regards to liquid and non-liquid assets (Berkman et al., 2000).

Educational opportunities also reflect the SES of parents so that economic returns on investments in education differ across racial, ethnic and gender groups. One has to be careful to interpret the number of years in education since that does not represent its quality. The social network naturally builds according to education and influences which information and coping strategies are provided. SES might be a consequence of the educational level since it indicates job security, stimulating work and self-worth (Backlund et al., 1999). The association with health might be explained through certain lifestyle behaviors and personality characteristics.

Those on temporary sick leave are included as working in both groups since they will still have the monetary, psychological and social network benefits of work. The impact of adverse working conditions always need to be balanced with economic, social and status rewards. Problematic is capturing nonstructural positions like women not engaged in formal employment but in housework or care giving that may also be dual burdens. Especially relevant for employment is the discussion between causation and selection. The observation of poor health might reflect the impact of unemployment or prior bad health might lead to becoming or staying unemployed (Cai et al., 2013). This strong association (García Gómez & López, 2006) explains why studies rarely fail to identify a relationship but one has to interpret the results cautiously, especially cross-sectional designs cannot differentiate causation and selection.

When investigating social capital, I focus on structural aspects here; the quality of relationships and aspects like generalized trust are not assessed. Not all ties are supportive; they might induce stress through role expectations. There is variation in the type, frequency, intensity and extent of provided support (Berkman et al., 2000). The number of friends might be overestimated in the GP due to the formulation of the question that explicitly asks to include family members, while the breast cancer survey asks to exclude them. Since the majority of respondents reports five or more friends, it would have been desirable to further differentiate but the survey on living conditions only reports the presented categories. The formulation of participation in organizations varies between the two surveys. The phrasing of the question in the survey on living conditions ("meeting others for shared hobbies or interests") might represent the size of the social network and availability of social support but might fail to determine engagement in organizations. To assess the living situation I would have liked to include the number of people in the household since this might determine more accurately the positive or negative effect. This number is missing for 93.6% of all BCS so that I cannot use it.

For optimal risk adjustment, I lack data on ethnicity. It might result in discrimination with negative physical and psychological impacts (Berkman et al., 2000) Age, gender and region are controlled for in including only female participants of the same age group from almost identical regional distribution. The results are only valid in the context of Norway with its specific economic and social characteristics like a high and highly redistributed income level and public health care system. Although the social security system is highly developed, social inequalities in health persist (Kravdal, 2000). It is argued that most health inequities are avoidable and that reducing them is required by social justice (Marmot et al., 2011).

10 Conclusion

The conducted study shows lower self-rated health of breast cancer survivors than for the general population, there is a need to improve their health. Self-rated health among the breast cancer survivors is less associated with social determinants than for the general population. In order to set up targeted interventions for breast cancer survivors, further research should be conducted on factors determining their self-rated health. There is a need to learn more about the causal relations and not merely associations. Health shocks with their physical, psychological and social consequences seem to have a strong impact on health and its determinants. It needs to be explored if self-ratings have changed due to an altered conceptualization of health with a reduced influence of social determinants in response to the health shock. To generalize the findings, further studies of different designs, for other health shocks and outside the Norwegian context are required. The findings confirm that social determinants of health are an important factor contributing to health inequities on societal level. Increased and sustainable political action beyond health policy is necessary to achieve health equity for all, irrespective of socioeconomic status.

References

Aas, E., Alstadsæter, A., & Feiring, E. (2013). Does Healthcare Moderate the Impact of Socioeconomic Status on Self-rated Health? *Journal of Clinical Research & Bioethics, 05*(01). doi: 10.4172/2155-9627.1000169

Adler, N. E., & Ostrove, J. M. (1999). Socioeconomic status and health: What we know and what we don't. *Socioeconomic Status and Health in Industrial Nations*, 3-15.

Ardebil, M., Bouzari, Z., Shènas, M., & Keighobadi, M. (2013). Depression and health related quality of life in breast cancer patients. *JPMA - Journal of the Pakistan Medical Association, 63*(1), 69-71.

Aneshensel, C. S., Frerichs, R. R., & Huba, G. J. (1984). Depression and Physical Illness: A Multiwave, Nonrecursive Causal Model. *Journal of Health and Social Behavior, 25*(4), 350-371. doi: 10.2307/2136376

Ashing-Giwa, K. T., Padilla, G., Tejero, J., Kraemer, J., Wright, K., Coscarelli, A., . . . Hills, D. (2004). Understanding the breast cancer experience of women: a qualitative study of African American, Asian American, Latina and Caucasian cancer survivors. *Psychooncology, 13*(6), 408-428. doi: 10.1002/pon.750

Back, J. H., & Lee, Y. (2011). Gender differences in the association between socioeconomic status (SES) and depressive symptoms in older adults. *Arch Gerontol Geriatr, 52*(3), e140-144. doi: 10.1016/j.archger.2010.09.012

Backlund, E., Sorlie, P. D., & Johnson, N. J. (1999). A comparison of the relationships of education and income with mortality: the national longitudinal mortality study. *Social Science & Medicine, 49*(10), 1373-1384. doi: http://dx.doi.org/10.1016/S0277-9536(99)00209-9

Baron-Epel, O., & Kaplan, G. (2001). General subjective health status or age-related subjective health status: does it make a difference? *Social Science & Medicine, 53*(10), 1373-1381. doi: http://dx.doi.org/10.1016/S0277-9536(00)00426-3

Baron-Epel, O., Weinstein, R., Haviv-Mesika, A., Garty-Sandalon, N., & Green, M. S. (2008). Individual-level analysis of social capital and health: A comparison of Arab and Jewish Israelis. *Social Science & Medicine, 66*(4), 900-910. doi: http://dx.doi.org/10.1016/j.socscimed.2007.10.025

Barsky, A. J., Cleary, P. D., & Klerman, G. L. (1992). Determinants of perceived health status of medical outpatients. *Social Science & Medicine, 34*(10), 1147-1154. doi: http://dx.doi.org/10.1016/0277-9536(92)90288-2

Bath, P. A. (2003). Differences Between Older Men and Women in the Self-Rated Health–Mortality Relationship. *The Gerontologist, 43*(3), 387-395.

Baum, A., Garofalo, J. P., & Yali, A. M. (1999). Socioeconomic status and chronic stress. Does stress account for SES effects on health? *Ann N Y Acad Sci, 896*, 131-144.

Bayliss, M., Rendas-Baum, R., White, M. K., Maruish, M., Bjorner, J., & Tunis, S. L. (2012). Health-related quality of life (HRQL) for individuals with self-reported chronic physical and/or mental health conditions: panel survey of an adult sample in the United States. *Health Qual Life Outcomes, 10*, 154. doi: 10.1186/1477-7525-10-154

Beers, M. H., Fletcher, A. J., Jones, T. V., Porter, R., Berkwits, M., & Kaplan, J. L. (2003). Section 15 - Cancer. In M. H. Beers (Ed.), *The Merck Manual of Medical Information - Home Edition* (2 ed.): Merck & Co., Inc.

Benyamini, Y., Blumstein, T., Lusky, A., & Modan, B. (2003). Gender Differences in the Self-Rated Health–Mortality Association: Is It Poor Self-Rated Health That Predicts Mortality or Excellent Self-Rated Health That Predicts Survival? *The Gerontologist, 43*(3), 396-405.

Benyamini, Y., & Idler, E. L. (1999). Community Studies Reporting Association between Self-Rated Health and Mortality: Additional Studies, 1995 to 1998. *Research on Aging, 21*(3), 392-401.

Benyamini, Y., Idler, E. L., Leventhal, H., & Leventhal, E. A. (2000). Positive affect and function as influences on self-assessments of health: expanding our view beyond illness and disability. *J Gerontol B Psychol Sci Soc Sci, 55*(2), P107-116.

Berkman, L., & Kawachi, I. (2000). *Social Epidemiology*: Oxford University Press.

Bjelland, I., Krokstad, S., Mykletun, A., Dahl, A. A., Tell, G. S., & Tambs, K. (2008). Does a higher educational level protect against anxiety and depression? The HUNT study. *Soc Sci Med, 66*(6), 1334-1345. doi: 10.1016/j.socscimed.2007.12.019

Bjorner, J. B. (1996). *Self-rated health: A useful concept in research, prevention and clinical medicine*: Swedish Council for Planning and Coordination of Research (Forskningsrådsnämnden)(FRN).

Bradburn, N. M. (1969). *The structure of psychological well-being*. Oxford, England: Aldine.

Bradley, C., Neumark, D., & Motika, M. (2012). The effects of health shocks on employment and health insurance: the role of employer-provided health insurance. *International Journal of Health Care Finance and Economics, 12*(4), 253-267. doi: 10.1007/s10754-012-9113-2

Cai, L., Mavromaras, K., & Oguzoglu, U. (2013). The Effects of Health Staus And Health Shocks on Hours Worked. *Health Economics*, n/a-n/a. doi: 10.1002/hec.2931

Cancer Treatment Centers of America (2014). Breast cancer survivors. Retrieved 31.03.2014, from http://www.cancercenter.com/community/survivors/

Chan, T. W., Birkelund, G. E., Aas, A. K., & Wiborg, Ø. (2011). Social Status in Norway. *European Sociological Review, 27*(4), 451-468. doi: 10.1093/esr/jcq019

Cheville, A. L., Basford, J. R., Dos Santos, K., & Kroenke, K. (2014). Symptom Burden and Comorbidities Impact the Consistency of Responses on Patient-Reported Functional Outcomes. *Archives of Physical Medicine and Rehabilitation, 95*(1), 79-86. doi: http://dx.doi.org/10.1016/j.apmr.2013.08.009

Coates, A., Abraham, S., Kaye, S. B., Sowerbutts, T., Frewin, C., Fox, R. M., & Tattersall, M. H. N. (1983). On the receiving end—patient perception of the side-effects of cancer chemotherapy. *European Journal of Cancer and Clinical Oncology, 19*(2), 203-208. doi: http://dx.doi.org/10.1016/0277-5379(83)90418-2

Coates, A., Gebski, V., Bishop, J. F., Jeal, P. N., Woods, R. L., Snyder, R., . . . Forbes, J. F. (1987). Improving the quality of life during chemotherapy for advanced breast cancer. A comparison of intermittent and continuous treatment strategies. *New England Journal of Medicine, 317*(24), 1490-1495.

Coates, A., Porzsolt, F., & Osoba, D. (1997). Quality of life in oncology practice: Prognostic value of EORTC QLQ-C30 scores in patients with advanced malignancy. *European Journal of Cancer, 33*(7), 1025-1030. doi: http://dx.doi.org/10.1016/S0959-8049(97)00049-X

Colby, D. A., & Shifren, K. (2012). Optimism, mental health, and quality of life: A study among breast cancer patients. *Psychology, Health & Medicine, 18*(1), 10-20. doi: 10.1080/13548506.2012.686619

Cooney, M., Galvin, R., Connolly, E., & Stokes, E. (2013). The International Classification of Functioning (ICF) core set for breast cancer from the perspective of women with the condition. *Disabil Rehabil, 35*(9), 740-748. doi: 10.3109/09638288.2012.707742

d'Hombres, B., Rocco, L., Suhrcke, M., & McKee, M. (2010). Does social capital determine health? Evidence from eight transition countries. *Health Economics, 19*(1), 56-74. doi: 10.1002/hec.1445

d'Uva, T. B., O'Donnell, O., & van Doorslaer, E. (2008). Differential health reporting by education level and its impact on the measurement of health inequalities among older Europeans. *Int J Epidemiol, 37*(6), 1375-1383. doi: 10.1093/ije/dyn146

Denton, M., & Walters, V. (1999). Gender differences in structural and behavioral determinants of health: an analysis of the social production of health. *Social Science & Medicine, 48*(9), 1221-1235. doi: http://dx.doi.org/10.1016/S0277-9536(98)00421-3

Doubeni, C. A., Schootman, M., Major, J. M., Stone, R. A., Laiyemo, A. O., Park, Y., . . . Schatzkin, A. (2012). Health status, neighborhood socioeconomic context, and premature mortality in the United States: The National Institutes of Health-AARP Diet and Health Study. *Am J Public Health, 102*(4), 680-688. doi: 10.2105/ajph.2011.300158

Espallargues, M., Valderas, J. M., & Alonso, J. (2000). Provision of feedback on perceived health status to health care professionals: a systematic review of its impact. *Med Care, 38*(2), 175-186.

Fayers, P. M., Hays, R., Bjorner, J., Idler, E. L., Schwartz, C., Sprangers, M., & Osoba, D. (2005). *Assessing quality of life in clinical trials* (P. M. Fayers & R. Hays Eds. Second Edition ed.). Oxford: Oxford University Press.

Fayers, P. M., & Sprangers, M. A. G. (2002). Understanding self-rated health. *The Lancet, 359*(9302), 187-188.

Fillenbaum, G. G. (1979). Social Context and Self-Assessments of Health among the Elderly. *Journal of Health and Social Behavior, 20*(1), 45-51. doi: 10.2307/2136478

Fiscella, K., & Franks, P. (2000). Individual income, income inequality, health, and mortality: what are the relationships? *Health Serv Res, 35*(1 Pt 2), 307-318.

Fox, J. P., Philip, E. J., Gross, C. P., Desai, R. A., Killelea, B., & Desai, M. M. (2013). Associations Between Mental Health and Surgical Outcomes Among Women Undergoing Mastectomy for Cancer. *The Breast Journal, 19*(3), 276-284. doi: 10.1111/tbj.12096

Franks, P., Gold, M. R., & Fiscella, K. (2003). Sociodemographics, self-rated health, and mortality in the US. *Social Science & Medicine, 56*(12), 2505-2514. doi: 10.1016/s0277-9536(02)00281-2

French, D., Browning, C., Kendig, H., Luszcz, M., Saito, Y., Sargent-Cox, K., & Anstey, K. (2012). A simple measure with complex determinants: investigation of the correlates of self-rated health in older men and women from three continents. *BMC Public Health, 12*(6), 12.

Fujiwara, T., & Kawachi, I. (2008). Social Capital and Health: A Study of Adult Twins in the U.S. *American Journal of Preventive Medicine, 35*(2), 139-144. doi: http://dx.doi.org/10.1016/j.amepre.2008.04.015

García-Gómez, P. (2011). Institutions, health shocks and labour market outcomes across Europe. *Journal of Health Economics, 30*(1), 200-213. doi: http://dx.doi.org/10.1016/j.jhealeco.2010.11.003

García Gómez, P., & López Nicolás, A. (2006). Health shocks, employment and income in the Spanish labour market. *Health Economics, 15*(9), 997-1009. doi: 10.1002/hec.1151

Giordano, G. N., & Lindstrom, M. (2010). The impact of changes in different aspects of social capital and material conditions on self-rated health over time: a longitudinal cohort study. *Soc Sci Med, 70*(5), 700-710. doi: 10.1016/j.socscimed.2009.10.044

Goldman, N., Glei, D. A., & Chang, M.-C. (2004). The role of clinical risk factors in understanding self-rated health. *Annals of Epidemiology, 14*(1), 49-57. doi: http://dx.doi.org/10.1016/S1047-2797(03)00077-2

Hackman, D. A., Farah, M. J., & Meaney, M. J. (2010). Socioeconomic status and the brain: mechanistic insights from human and animal research. *Nat Rev Neurosci, 11*(9), 651-659.

Han, B., Small, B. J., & Haley, W. E. (1999). The Effects of Race, Gender, and Education on the Structure of Self-Rated Health among Community-Dwelling Older Adults. *Annals of the New York Academy of Sciences, 896*(1), 442-447. doi: 10.1111/j.1749-6632.1999.tb08165.x

Headey, B. W., Kelley, J., & Wearing, A. J. (1993). Dimensions of mental health: Life satisfaction, positive affect, anxiety and depression [Press release]

Holt-Lunstad, J., Smith, T. B., & Layton, J. B. (2010). Social relationships and mortality risk: a meta-analytic review. *PLoS Med, 7*(7), e1000316. doi: 10.1371/journal.pmed.1000316

Idler, E. L. (1993). Age Differences in Self–Assessments of Health: Age Changes, Cohort Differences, or Survivorship? *Journal of Gerontology, 48*(6), S289-S300.

Idler, E. L., & Benyamini, Y. (1997). Self-Rated Health and Mortality: A Review of Twenty-Seven Community Studies. *Journal of Health and Social Behavior, 38*(1), 21-37. doi: 10.2307/2955359

Idler, E. L., Hudson, S. V., & Leventhal, H. (1999). The Meanings of Self-Ratings of Health: A Qualitative and Quantitative Approach. *Research on Aging, 21*(3), 458-476.

Idler, E. L., & Kasl, S. V. (1995). Self-ratings of health: do they also predict change in functional ability? *J Gerontol B Psychol Sci Soc Sci, 50*(6), S344-353.

Inbar, C., Ety, B., Ayala, H., & Tamer, P. (2013). The mental health of breast cancer survivors and their adolescent daughters. *Psychooncology, 22*(6), 1236-1241. doi: 10.1002/pon.3127

Iversen, T. (2008). An exploratory study of associations between social capital and self-assessed health in Norway. *Health Econ Policy Law, 3*(Pt 4), 349-364. doi: 10.1017/S1744133108004544

Jahoda, M. (1950). Toward a social psychology of mental health *Symposium on the healthy personality* (pp. 211-230). Oxford, England: Josiah Macy, Jr. Foundation.

Jeffe, D. B., Pérez, M., Liu, Y., Collins, K. K., Aft, R. L., & Schootman, M. (2012). Quality of life over time in women diagnosed with ductal carcinoma in situ, early-stage invasive breast cancer, and age-matched controls. *Breast Cancer Research and Treatment, 134*(1), 379-391. doi: 10.1007/s10549-012-2048-y

Johnston, D. W., & Lee, W.-S. (2009). Retiring to the good life? The short-term effects of retirement on health. *Economics Letters, 103*(1), 8-11. doi: http://dx.doi.org/10.1016/j.econlet.2009.01.015

Johnston, S. A., & Ware, J. E., Jr. (1976). Income group differences in relationships among survey measures of physical and mental health. *Health Serv Res, 11*(4), 416-429.

Jorm, A. F. (2012). Mental health literacy: Empowering the community to take action for better mental health. *American Psychologist, 67*(3), 231-243. doi: 10.1037/a0025957

Jung, M., Ramanadhan, S., & Viswanath, K. (2013). Effect of information seeking and avoidance behavior on self-rated health status among cancer survivors. *Patient Educ Couns, 92*(1), 100-106. doi: 10.1016/j.pec.2013.02.008

Jusot, F., Grignon, M., & Dourgnon, P. (2008). Access to psycho-social resources and health: exploratory findings from a survey of the French population. *Health Econ Policy Law, 3*(Pt 4), 365-391. doi: 10.1017/S1744133108004556

Jylha, M. (2009). What is self-rated health and why does it predict mortality? Towards a unified conceptual model. *Soc Sci Med, 69*(3), 307-316. doi: 10.1016/j.socscimed.2009.05.013

Jylha, M., Guralnik, J. M., Ferrucci, L., Jokela, J., & Heikkinen, E. (1998). Is Self-Rated Health Comparable across Cultures and Genders? *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 53B*(3), S144-S152. doi: 10.1093/geronb/53B.3.S144

Kaplan, G., & Baron-Epel, O. (2003). What lies behind the subjective evaluation of health status? *Social Science & Medicine, 56*(8), 1669-1676. doi: http://dx.doi.org/10.1016/S0277-9536(02)00179-X

Kennedy, B., Kawachi, I., Glass, R., & Prothrow-Sith, D. (1998). Income distribution, socioeconomic status, and self rated health in the United States: multilevel analysis. *British Medical Journal, 317*, 917-921.

Kessler, R. C., & Zhao, S. (1999). The prevalence of mental illness [Press release]

Keyes, C. L. M. (2002). The mental health continuum: From languishing to flourishing in life

Keyes, C. L. M. (2005). Mental Illness and/or Mental Health? Investigating Axioms of the Complete State Model of Health. *Journal of Consulting and Clinical Psychology, 73*(3), 539-548. doi: 10.1037/0022-006X.73.3.539

Keyes, C. L. M., & Lopez, S. J. (2002). Toward a science of mental health: Positive directions in diagnosis and interventions. In C. R. S. S. J. Lopez (Ed.), *Handbook of positive psychology* (pp. 45-59). New York, NY, US: Oxford University Press.

Keyes, C. L. M., & Waterman, M. B. (2003). Dimensions of well-being and mental health in adulthood. In M. H. Bornstein, L. Davidson, C. L. M. Keyes & K. A. Moore (Eds.), *Well-being: Positive development across the life course* (pp. 477-497). Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers.

Kim, D., Baum, C. F., Ganz, M. L., Subramanian, S. V., & Kawachi, I. (2011). The contextual effects of social capital on health: a cross-national instrumental variable analysis. *Soc Sci Med, 73*(12), 1689-1697. doi: 10.1016/j.socscimed.2011.09.019

Kondo, N., Sembajwe, G., Kawachi, I., van Dam, R. M., Subramanian, S. V., & Yamagata, Z. (2009). Income inequality, mortality, and self rated health: meta-analysis of multilevel studies. *BMJ, 339*, b4471. doi: 10.1136/bmj.b4471

Kosidou, K., Dalman, C., Lundberg, M., Hallqvist, J., Isacsson, G., & Magnusson, C. (2011). Socioeconomic status and risk of psychological distress and depression in the

Stockholm Public Health Cohort: A population-based study. *Journal of affective disorders, 134*(1), 160-167.

Kravdal, Ø. (2000). Social inequalities in cancer survival. *Population Studies, 54*(1), 1-18. doi: 10.1080/713779066

Kroenke, C. H., Kubzansky, L. D., Schernhammer, E. S., Holmes, M. D., & Kawachi, I. (2006). Social networks, social support, and survival after breast cancer diagnosis. *J Clin Oncol, 24*(7), 1105-1111. doi: 10.1200/jco.2005.04.2846

Lantz, P., House, J., Lepkowski, J., Williams, D., Mero, R., & Chen, J. (1998). Socioeconomic Factors, Health Behaviors and Mortality. *JAMA, 279*(21), 1703-1708.

Lazzarino, A. I., Yiengprugsawan, V., Seubsman, S. A., Steptoe, A., & Sleigh, A. C. (2014). The associations between unhealthy behaviours, mental stress, and low socio-economic status in an international comparison of representative samples from Thailand and England. *Global Health, 10*(1), 10. doi: 10.1186/1744-8603-10-10

Lee, J.-S., Koeske, G. F., & Sales, E. (2004). Social support buffering of acculturative stress: a study of mental health symptoms among Korean international students. *International Journal of Intercultural Relations, 28*(5), 399-414. doi: http://dx.doi.org/10.1016/j.ijintrel.2004.08.005

Lee, Y. (2000). The predictive value of self assessed general, physical, and mental health on functional decline and mortality in older adults. *Journal of Epidemiology and Community Health, 54*(2), 123-129.

Liavaag, A. H., Dorum, A., Fossa, S. D., Trope, C., & Dahl, A. A. (2009). Morbidity associated with "self-rated health" in epithelial ovarian cancer survivors. *BMC Cancer, 9*, 2. doi: 10.1186/1471-2407-9-2

Mackenbach, J. P., Stirbu, I., Roskam, A. J., Schaap, M. M., Menvielle, G., Leinsalu, M., & Kunst, A. E. (2008). Socioeconomic inequalities in health in 22 European countries. *N Engl J Med, 358*(23), 2468-2481. doi: 10.1056/NEJMsa0707519

Manderbacka, K., Kåreholt, I., Martikainen, P., & Lundberg, O. (2003). The effect of point of reference on the association between self-rated health and mortality. *Social Science & Medicine, 56*(7), 1447-1452. doi: http://dx.doi.org/10.1016/S0277-9536(02)00141-7

Marmot, M. (2011). Interim second report on social determinants of health and the health divide in the WHO European Region.

Matthews, K. A., & Gallo, L. C. (2011). Psychological perspectives on pathways linking socioeconomic status and physical health. *Annu Rev Psychol, 62*, 501-530. doi: 10.1146/annurev.psych.031809.130711

Matthews, K. A., Gallo, L. C., & Taylor, S. E. (2010). Are psychosocial factors mediators of socioeconomic status and health connections? A progress report and blueprint for the future. *Ann N Y Acad Sci, 1186*, 146-173. doi: 10.1111/j.1749-6632.2009.05332.x

McCrae, R., Bartone, P., & Costa, P. (1976). Age, Anxiety and Self-Reported Health. *The International Journal of Aging and Human Development, 7*(1), 49-58.

McGee, D. L., Liao, Y., Cao, G., & Cooper, R. S. (1999). Self-reported Health Status and Mortality in a Multiethnic US Cohort. *American Journal of Epidemiology, 149*(1), 41-46.

Mechanic, D. (1978). Effects of Psychological Distress on Perceptions of Physical Health and Use of Medical and Psychiatric Facilities. *Journal of Human Stress, 4*(4), 26-32. doi: 10.1080/0097840X.1978.10545983

Mello, S., Tan, A. S. L., Armstrong, K., Sanford Schwartz, J., & Hornik, R. C. (2012). Anxiety and Depression Among Cancer Survivors: The Role of Engagement With Sources of Emotional Support Information. *Health Commun, 28*(4), 389-396. doi: 10.1080/10410236.2012.690329

Miilunpalo, S., Vuori, I., Oja, P., Pasanen, M., & Urponen, H. (1997). Self-Rated Health Status as a Health Measure: The Predictive Value of Self-Reported Health Status on the Use of Physician Services and on Mortality in the Working-Age Population. *Journal of Clinical Epidemiology, 50*(5), 517-528.

Miller, C. L., Denner, P. R., & Richardson, V. E. (1976). Assisting the psychosocial problems of cancer patients: A review of current research. *International Journal of Nursing Studies, 13*(3), 161-166. doi: http://dx.doi.org/10.1016/0020-7489(76)90011-0

Newbold, P., Carlson, W., & Thorne, B. (2013). *Statistics for Business and Economics* (8 ed.): Pearson Education Limited.

Norwegian Standard Classification of Education (2001).

OECD. (2013). OECD Better Life Index.

Osoba, D. (1999). What has been learned from measuring health-related quality of life in clinical oncology. *European Journal of Cancer, 35*(11), 1565-1570. doi: http://dx.doi.org/10.1016/S0959-8049(99)00192-6

Ostrove, J., Adler, N., Kuppermann, M., & Washington, A. (2000). Objective and Subjective Assessments of Socioeconomic Status and Their Relationship to Self-Rated Health in and Ethnically Diverse Sample of Pregnant Women. *Health Psychology, 19*(6), 613-618.

Parry, D. C. (2007). "There is Life after Breast Cancer": Nine Vignettes Exploring Dragon Boat Racing for Breast Cancer Survivors. *Leisure Sciences, 29*(1), 53-69. doi: 10.1080/01490400600983420

Patterson, R. E., Saquib, N., Natarajan, L., Rock, C. L., Parker, B. A., Thomson, C. A., & Pierce, J. P. (2011). Improvement in self-reported physical health predicts longer survival among women with a history of breast cancer. *Breast Cancer Research and Treatment, 127*(2), 541-547. doi: 10.1007/s10549-010-1236-x

Pearson, A. L., Griffin, E., Davies, A., & Kingham, S. (2013). An ecological study of the relationship between socioeconomic isolation and mental health in the most deprived areas in Auckland, New Zealand. *Health & Place, 19*(0), 159-166. doi: http://dx.doi.org/10.1016/j.healthplace.2012.10.012

Ramanadhan, S., & Viswanath, K. (2006). Health and the information nonseeker: a profile. *Health Commun, 20*(2), 131-139. doi: 10.1207/s15327027hc2002_4

Rocco, L., & Fumagalli, E. (2014). The Empirics of Social Capital and Health. In S. Folland & L. Rocco (Eds.), *The Economics of Social Capital and Health - A Conceptual and Empirical Roadmap* (Vol. 2): World Scientific.

Rocco, L., Fumagalli, E., & Suhrcke, M. (2013). From Social Capital To Health - And Back. *Health Economics*, n/a-n/a. doi: 10.1002/hec.2934

Ronconi, L., Brown, T. T., & Scheffler, R. M. (2012). Social capital and self-rated health in Argentina. *Health Economics, 21*(2), 201-208. doi: 10.1002/hec.1696

Rostila, M., Kölegård, M. L., & Fritzell, J. (2012). Income inequality and self-rated health in Stockholm, Sweden: A test of the 'income inequality hypothesis' on two levels of aggregation. *Social Science & Medicine, 74*(7), 1091-1098. doi: http://dx.doi.org/10.1016/j.socscimed.2011.11.027

Ryff, C. D., & Keyes, C. L. M. (1995). The structure of psychological well-being revisited. *Journal of Personality and Social Psychology, 69*(4), 719-727. doi: 10.1037/0022-3514.69.4.719

Santiago, C. D., Wadsworth, M. E., & Stump, J. (2011). Socioeconomic status, neighborhood disadvantage, and poverty-related stress: Prospective effects on psychological syndromes among diverse low-income families. *Journal of Economic Psychology, 32*(2), 218-230. doi: http://dx.doi.org/10.1016/j.joep.2009.10.008

Sartorius, N. (2001). The economic and social burden of depression [Press release]

Scheffler, R. M., & Brown, T. T. (2008). Social capital, economics, and health: new evidence. *Health Econ Policy Law, 3*(Pt 4), 321-331. doi: 10.1017/s1744133108004593

Scheid, T., & Brown, T. (2010). *A Handbook for the Study of Mental Health - Social Contexts, Theories, and Systems* (2 ed.). Cambridge: Cambridge University Press.

Scott, W. A. (1958). Social psychological correlates of mental illness and mental health. *Psychological Bulletin, 55*(2), 65-87. doi: 10.1037/h0045425

Shadbolt, B., Barresi, J., & Craft, P. (2002). Self-Rated Health as a Predictor of Survival Among Patients With Advanced Cancer. *Journal of Clinical Oncology, 20*(10), 2514-2519.

Sklar, M., Groessl, E. J., O'Connell, M., Davidson, L., & Aarons, G. A. (2013). Instruments for measuring mental health recovery: A systematic review. *Clinical Psychology Review, 33*(8), 1082-1095. doi: http://dx.doi.org/10.1016/j.cpr.2013.08.002

Strand, B. H., Groholt, E. K., Steingrimsdottir, O. A., Blakely, T., Graff-Iversen, S., & Naess, O. (2010). Educational inequalities in mortality over four decades in Norway: prospective study of middle aged men and women followed for cause specific mortality, 1960-2000. *BMJ, 340*, c654. doi: 10.1136/bmj.c654

Subramanian, S. V., Huijts, T., & Avendano, M. (2010). Self-reported health assessments in the 2002 World Health Survey: how do they correlate with education? *Bull World Health Organ, 88*(2), 131-138. doi: 10.2471/BLT.09.067058

Sundmacher, L. (2012). The effect of health shocks on smoking and obesity. *The European Journal of Health Economics, 13*(4), 451-460. doi: 10.1007/s10198-011-0316-0

Taylor, S. E., & Seeman, T. E. (1999). Psychosocial resources and the SES-health relationship. *Ann N Y Acad Sci, 896*, 210-225.

Trading Economics (2014). Norway Unemployment Rate. Retrieved 04-28-2014, from http://www.tradingeconomics.com/norway/unemployment-rate

Treanor, C., & Donnelly, M. (2012). An international review of the patterns and determinants of health service utilisation by adult cancer survivors. *BMC Health Serv Res, 12*, 316. doi: 10.1186/1472-6963-12-316

Viswanath, K., Breen, N., Meissner, H., Moser, R. P., Hesse, B., Steele, W. R., & Rakowski, W. (2006). Cancer knowledge and disparities in the information age. *J Health Commun, 11 Suppl 1*, 1-17. doi: 10.1080/10810730600977517

Wagstaff, A. (2007). The economic consequences of health shocks: Evidence from Vietnam. *Journal of Health Economics, 26*(1), 82-100. doi: http://dx.doi.org/10.1016/j.jhealeco.2006.07.001

Wagstaff, A., & Lindelow, M. (2013). Are Health Shocks Different? Evidence From a Multishock Survey In Laos. *Health Economics*, n/a-n/a. doi: 10.1002/hec.2944

Wakefield, J. C. P. D. S. W., & First, M. B. M. D. (2013). Clarifying the Boundary Between Normality and Disorder: A Fundamental Conceptual Challenge for Psychiatry. *Canadian Journal of Psychiatry, 58*(11), 603-605.

Wen, K. Y., Fang, C. Y., & Ma, G. X. (2013). Breast cancer experience and survivorship among Asian Americans: a systematic review. *J Cancer Surviv*. doi: 10.1007/s11764-013-0320-8

Wilcox, V. L., Kasl, S. V., & Idler, E. L. (1996). Self-rated health and physical disability in elderly survivors of a major medical event. *J Gerontol B Psychol Sci Soc Sci, 51*(2), S96-104.

World Health Organization (1948), Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 1946.

World Health Organization (2004). Prevalence, severity, and unmet need for treatment of mental disorders in the world health organization world mental health surveys. *JAMA, 291*(21), 2581-2590. doi: 10.1001/jama.291.21.2581

World Health Organization (2008), Closing the gap in a generation – health equity through action on the social determinants of health.

World Health Organization (2010). Global status report on noncommunicable diseases 2010.

World Health Organization (2011). Noncommunicable diseases country profiles 2011.

Yamamura, E. (2011). Differences in the effect of social capital on health status between workers and non-workers. *International Review of Economics, 58*(4), 385-400. doi: 10.1007/s12232-011-0135-8

Appendix

1 Questionnaires

Extracted relevant questions as used in the analyses.

1.1 Breast Cancer Survivors

Foreningen for brystkreftopererte

UNIVERSITETET I OSLO
DET MEDISINSKE FAKULTET

Rehabilitering, arbeidsevne, mammografi og gentest for kvinner med brystkreft: Fokus på sosial ulikhet

Screening

1. Hvilket år er du født? _____
2. Hvilket fylke bor du i? _____

Diagnostisering

11. Tidspunkt for diagnose: År _____ Måned _____

13. Da du hadde fått diagnosen, hvilken behandling fikk du (*ett eller flere kryss*)?

- ☐ Brystbevarende kirugi
- ☐ Kirurgi med fjerning av bryst
- ☐ Fjernet mer enn to lympekjertler
- ☐ Cellegift
- ☐ Stråling
- ☐ Langvarig behandling med medisiner
- ☐ Annen behandling, spesifiser:_____

14. Har du fått påvist spredning etter at du hadde avsluttet behandlingen?

- ☐ Ja *(gå til spørsmål 15)*
- ☐ Nei *(gå til spørsmål 17)*

19. Har du deltatt på en eller flere av disse typene med rehabilitering *(ett eller flere kryss)*?

- ☐ Fysioterapi
- ☐ Annen form for trening
- ☐ Haugelandsenteret
- ☐ Selvhjelpsgrupper (tilbud i lokalforeningen)
- ☐ Hjemmebesøk
- ☐ Kurs (for eksempel Catosenteret, Halvorsbøle, Montebello, Røros)
- ☐ Oppfølgingsgrupper på sykehuset
- ☐ Annet, spesifiser: _____

Utdanning og arbeid

21. Hva er din høyeste fullførte utdanning *(kun ett kryss)*?

- ☐ Grunnskole (inkluderer folkeskole og realskole)
- ☐ Videregående skole
- ☐ Høyskole og universitet kort utdanning (t.o.m 4 år)
- ☐ Høyskole og universitet lang utdanning (mer enn 4 år)

22. Var du i arbeid før du fikk brystkreft?

- ☐ Ja, heltid *(gå til spørsmål 23)*
- ☐ Ja, deltid, angi stillingsandel: __ __ % *(gå til spørsmål 23)*
- ☐ Hjemmeværende *(gå til spørsmål 32)*
- ☐ Nei, aldrespensjonist, inkl AFP *(gå til spørsmål 32)*
- ☐ Nei, uførepensjonist *(gå til spørsmål 32)*
- ☐ Nei, annen årsak *(gå til spørsmål 32)*

23. Er du fortsatt sykemeldt *(helt eller delvis)*?

- ☐ Ja
- ☐ Nei

24.Hvor lenge var du eller har du vært sykemeldt *(helt eller delvis)* etter du ble behandlet *(Hvis du har hatt tilbakefall, tenk på første gangen du ble behandlet)*?
Angi totalt antall måneder fra diagnose: __ __

25. Hvor mange måneder etter du fikk brystkreft begynte du å jobbe igjen?
Antall: __ __ måneder

Inntekt

32. Hva var din bruttoinntekt *(inklusiv skatt, sosiale stønader og andre bidrag)* det året du ble diagnostisert med brystkreft?

- ☐ Under 100 000 kr
- ☐ 100 000 – 199 999 kr
- ☐ 200 000 – 399 999 kr
- ☐ 400 000 – 599 999 kr
- ☐ 600 000 – 999 999 kr
- ☐ 1 million og over

33. Kan du anslå husholdningens totale bruttoinntekt samme året? _____ kr

34. Hva er din bruttoinntekt forrige måned? _____kr

Helsetilstand

37. Hvordan opplever du din helsetilstand for tiden?

- ☐ Meget god
- ☐ God
- ☐ Verken god eller dårlig
- ☐ Dårlig
- ☐ Veldig dårlig

38. Har du i løpet av de to siste ukene vært plaget med noe av det følgende?
(Kryss for hver linje)

	Ikke plaget	Litt plaget	Ganske mye plaget	Veldig mye plaget
Stadig redd eller engstelig	☐	☐	☐	☐
Nervøsitet, indre uro	☐	☐	☐	☐
Følelse av håpløshet med hensyn til fremtiden	☐	☐	☐	☐
Nedtrykt, tungsindig	☐	☐	☐	☐
Mye bekymret eller urolig	☐	☐	☐	☐

Familie og venner

39. Da du ble diagnostisert med brystkreft, bodde du sammen med noen?

□ Ja *(gå til spørsmål 40)*

□ Nei *(gå til spørsmål 41)*

40. Hvem bodde du i så fall sammen med?

Ektefelle/samboer	□ Ja	□ Nei	
Andre personer, 18 år og eldre	□ Ja	□ Nei	Antall __ __
Personer under 18 år	□ Ja	□ Nei	Antall __ __

41. Hvor mange gode venner har du? Antall venner: __ __

(Regn med de du kan snakke fortrolig med og som kan gi deg hjelp dersom du trenger det. Tell ikke med de du bor sammen med, men ta med andre slektninger).

42. Hvor mange foreninger, lag, grupper, kirkesamfunn e.l. deltar du i på fritiden? *(skriv 0 hvis ingen)*

Antall: __ __

1.1.1 Survey on Living Conditions, Health, Care and Social Contact 2012

Retrieved from the Study Documentation by Statistics Norway (2014).

# v001: Kjønn	
Information	[Type= continuous] [Format=numeric] [Range= 1-9] [Missing=*]
Statistics [NW/ W]	[Valid=5660 /-] [Invalid=0 /-]
Literal question	Oppgi kjønn for IO.
Concepts	Gender

# v004: IOs fodselsår	
Information	[Type= continuous] [Format=numeric] [Range= 1916-1996] [Missing=*]
Statistics [NW/ W]	[Valid=5660 /-] [Invalid=0 /-] [Mean=1964.26 /-] [StdDev=18.391 /-]
Literal question	IOs fodselsår.
Concepts	Age

# v009: Gift eller samboende	
Statistics [NW/ W]	[Valid=5660 /-] [Invalid=0 /-]
Literal question	Er du gift eller samboende?
Concepts	Marital status

v033: Utfort inntektsgiv.arb. forrige uke

Value	Label
2	Nei
8	Vil ikke svare
9	Vet ikke

Warning: these figures indicate the number of cases found in the data file. They cannot be interpreted as summary statistics of the population of interest.

# v048: Egenvurdering av helse	
Information	[Type= discrete] [Format=numeric] [Range= 1-9] [Missing=*]
Statistics [NW/ W]	[Valid=5660 /-] [Invalid=0 /-]
Literal question	Hvordan vurderer du din egen helse sånn i alminnelighet. Vil du si at den er meget god, god, verken god eller dårlig, dårlig eller meget dårlig?
Interviewer's instructions	Alle.
Concepts	Health, Diseases

Value	Label
1	Meget god
2	God
3	Verken god eller dårlig
4	Dårlig
5	Meget dårlig
8	Vil ikke svare
9	Vet ikke

Warning: these figures indicate the number of cases found in the data file. They cannot be interpreted as summary statistics of the population of interest.

# v049: Varig sykdom eller lidelse	
Information	[Type= discrete] [Format=numeric] [Range= 1-9] [Missing=*]
Statistics [NW/ W]	[Valid=5660 /-] [Invalid=0 /-]
Literal question	Har du noen varig sykdom eller lidelse, noen medfodt sykdom eller virkning av skade?

v407: Antall en kan få hjelp av ved problemer

Statistics [NW/ W]	[Valid=5652 /-] [Invalid=8 /-]
Literal question	Hvor mange står deg så nær at du kan regne med dem hvis du får store personlige problemer?
Post-question	Regn også med nærmeste familie
Concepts	Social networks

Value	Label
1	Ingen
2	1 eller 2
3	3-5
4	Flere enn 5
5	
8	Vil ikke svare
9	Vet ikke
Sysmiss	

Warning: these figures indicate the number of cases found in the data file. They cannot be interpreted as summary statistics of the population of interest.

v425: Treffer du andre for å dyrke felles hobbier eller interesser?

Information	[Type= discrete] [Format=numeric] [Range= 1-9] [Missing=*]
Statistics [NW/ W]	[Valid=5652 /-] [Invalid=8 /-]
Literal question	Treffer du andre for å dyrke felles hobbier eller interesser?
Concepts	Hobbies

Value	Label
1	Ja
2	Nei
8	Vil ikke svare
9	Vet ikke
Sysmiss	

Warning: these figures indicate the number of cases found in the data file. They cannot be interpreted as summary statistics of the population of interest.

v464: Landsdel

Information	[Type= discrete] [Format=numeric] [Range= 1-9] [Missing=*]
Statistics [NW/ W]	[Valid=5660 /-] [Invalid=0 /-]
Literal question	Landsdel
Concepts	Place of residence

Value	Label
1	Akershus og Oslo
2	Hedmark og Oppland
3	Østlandet ellers
4	Agder og Rogaland
5	Vestlandet
6	Trøndelag
7	Nord-Norge
8	Vil ikke svare
9	Vet ikke

Warning: these figures indicate the number of cases found in the data file. They cannot be interpreted as summary statistics of the population of interest.

v474: Plager og problemer: nervøsitet, indre uro

Information	[Type= discrete] [Format=numeric] [Range= 1-9] [Missing=*]
Statistics [NW/ W]	[Valid=3892 /-] [Invalid=1768 /-]
Literal question	Angi hvor mye hvert enkelt problem har plaget deg eller vært til besvær i løpet av de siste 14 dagene... ... 4. Nervøsitet, indre uro
Concepts	Mental disorders

Value	Label
1	Ikke plaget
2	Litt plaget
3	Ganske mye plaget
4	Veldig mye plaget
9	Uoppgitt
Sysmiss	

Warning: these figures indicate the number of cases found in the data file. They cannot be interpreted as summary statistics of the population of interest.

v476: Plager og problemer: stadig redd eller engstelig

Value	Label
1	Ikke plaget
2	Litt plaget
3	Ganske mye plaget
4	Veldig mye plaget
9	Uoppgitt
Sysmiss	

Warning: these figures indicate the number of cases found in the data file. They cannot be interpreted as summary statistics of the population of interest.

v487: Plager og problemer: følelse av håpløshet med tanke på fremtiden

Information	[Type= discrete] [Format=numeric] [Range= 1-9] [Missing=*]
Statistics [NW/ W]	[Valid=3899 /-] [Invalid=1761 /-]
Literal question	Angi hvor mye hvert enkelt problem har plaget deg eller vært til besvær i løpet av de siste 14 dagene... ... 17. Følelse av håpløshet med tanke på fremtiden
Concepts	Mental disorders

Value	Label
1	Ikke plaget
2	Litt plaget
3	Ganske mye plaget
4	Veldig mye plaget
9	Uoppgitt
Sysmiss	

Warning: these figures indicate the number of cases found in the data file. They cannot be interpreted as summary statistics of the population of interest.

v488: Plager og problemer: nedtrykt, tungsindig

Information	[Type= discrete] [Format=numeric] [Range= 1-9] [Missing=*]
Statistics [NW/ W]	[Valid=3894 /-] [Invalid=1766 /-]
Literal question	Angi hvor mye hvert enkelt problem har plaget deg eller vært til besvær i løpet av de siste 14 dagene... ... 18. Nedtrykt, tungsindig
Concepts	Mental disorders

Value	Label
1	Ikke plaget
2	Litt plaget
3	Ganske mye plaget
4	Veldig mye plaget
9	Uoppgitt
Sysmiss	

Warning: these figures indicate the number of cases found in the data file. They cannot be interpreted as summary statistics of the population of interest.

v492: Plager og problemer: mye bekymret eller urolig

Information	[Type= discrete] [Format=numeric] [Range= 1-9] [Missing=*]
Statistics [NW/ W]	[Valid=3900 /-] [Invalid=1760 /-]
Literal question	Angi hvor mye hvert enkelt problem har plaget deg eller vært til besvær i løpet av de siste 14 dagene... ... 22. Følelse av å være lurt i en felle eller fanget
Concepts	Mental disorders

Value	Label
1	Ikke plaget
2	Litt plaget
3	Ganske mye plaget
4	Veldig mye plaget
9	Uoppgitt
Sysmiss	

Warning: these figures indicate the number of cases found in the data file. They cannot be interpreted as summary statistics of the population of interest.

v510: Hatt alvorlig økonomiske problemer?

Information	[Type= discrete] [Format=numeric] [Range= 1-9] [Missing=*]
Statistics [NW/ W]	[Valid=3856 /-] [Invalid=1804 /-]
Literal question	Har noe av det følgende hendt deg i løpet av de siste 12 månedene? ... 10. Du har hatt alvorlige økonomiske problemer
Concepts	Economic issues

Value	Label
1	Ja
2	Nei
9	Uoppgitt
Sysmiss	

Warning: these figures indicate the number of cases found in the data file. They cannot be interpreted as summary statistics of the population of interest.

v620: Utdanningsnivå fra register

Information	[Type= continuous] [Format=numeric] [Range= 0-9] [Missing=*]
Statistics [NW/ W]	[Valid=5638 /-] [Invalid=22 /-]
Literal question	Utdanningsnivå fra register
Concepts	Educational levels

1.2 Data Application

Confirmed data access form and declaration of confidentiality from Norwegian Social Science Data Services (NSD).

Norsk samfunnsvitenskapelig datatjeneste AS
NORWEGIAN SOCIAL SCIENCE DATA SERVICES

Harald Hårfagres gate 29
N-5007 Bergen
Norway
Tel: +47-55 58 21 17
Fax: +47-55 58 96 50
nsd@nsd.uib.no
www.nsd.uib.no
Org.nr: 985 321 884

Jana Pohl
Olav M. Trosviks vei 34, H0106
0864 Oslo

Vår dato: 05-02-2014 Vår ref.: 201400031 Deres dato: 04-02-2014 Tilgangsnummer.: 3290

TILGANG PÅ DATA FRA STATISTISK SENTRALBYRÅS INTERVJUUNDERSØKELSER.
Levekårsundersøkelsen om helse, omsorg og sosial kontakt 2012

Du gis herved tillatelse til å benytte data fra nevnte undersøkelse(r) i din masteroppgave, slik som beskrevet i søknaden.

Ettersom dette er taushetsbelagte data, ber vi om at du merker deg følgende:

1) Tilgang på data fås først når vedlagte taushets- og veiledererklæring er fylt ut og sendt det NSD-kontor som skal utlevere data. Dersom andre personer assisterer deg ved bruken av data, må disse også underskrive taushetserklæring.

2) Data utleveres **kun** til eget bruk og **kun** til det prosjekt som er beskrevet i søknaden. Det er ikke tillatt å gi andre tilgang til de data du får (utover dem som er nevnt ovenfor).

3) Datafilen skal slettes eller leveres tilbake til NSD etter endt prosjekt eller senest 05-02-2016.

4) Dersom du har behov for å bruke dataene til annet formål, må det søkes om ny tilgang.

5) Bruker plikter å referere til produsent og distributør av dataene ved å skrive følgende i forord eller fotnote i eventuelle publikasjoner:
"(En del av) De data som er benyttet her er hentet fra Statistisk sentralbyrås "Levekårsundersøkelsen om helse, omsorg og sosial kontakt 2012". Data er tilrettelagt og stilt til disposisjon i anonymisert form av Norsk samfunnsvitenskapelig datatjeneste AS (NSD). Verken Statistisk sentralbyrå eller NSD er ansvarlig for analysen av dataene eller de tolkninger som er gjort her."

6) Bruker plikter å sende NSD/Bergen kopi av eventuelle rapporter/publikasjoner som er utarbeidet på basis av dataene. Dette kan enten være en elektronisk versjon eller tre eksemplarer i papirformat. Disse vil refereres til på våre nettsider og kan gjøres tilgjengelig på nett, om det er ønskelig.

Kontakt: Christopher Tønnessen

Vennlig hilsen

Bjørn Henrichsen

Christopher Tønnessen

Avdelingskontorer / District Offices:
OSLO: NSD, Universitetet i Oslo, Postboks 1055 Blindern, 0316 Oslo. Tel: +47-22 85 52 11. nsd@uio.no
TRONDHEIM: NSD, Norges teknisk-naturvitenskapelige universitet, 7491 Trondheim. Tel: +47-73 59 19 07. kyrre.svarva@svt.ntnu.no
TROMSØ: NSD, HSL, Universitetet i Tromsø, 9037 Tromsø. Tel: +47-77 64 61 53. solvi.anderssen@uit.no

Norsk samfunnsvitenskapelig datatjeneste AS
NORWEGIAN SOCIAL SCIENCE DATA SERVICES

Harald Hårfagres gate 29
N-5007 Bergen
Norway
Tel: +47-55 58 21 17
Fax: +47-55 58 96 50
nsd@nsd.uib.no
www.nsd.uib.no
Org.nr: 985 321 884

Taushetserklæring

for personer som har fått tilgang til individdata fra Norsk samfunnsvitenskapelig datatjeneste

Navn: Jana Pohl

Arbeidssted: Universitetet i Oslo

Undersøkelse: Levekårsundersøkelsen om helse, omsorg og sosial kontakt 2012

Jeg forplikter meg med dette til å

1) bevare taushet om personopplysninger jeg får kjennskap til gjennom undersøkelse(ne) som er stilt til rådighet gjennom NSD.

2) referere til produsent og distributør av dataene ved å skrive følgende i forord eller fotnote i eventuelle publikasjoner:
"(En del av) De data som er benyttet her er hentet fra "Levekårsundersøkelsen om helse, omsorg og sosial kontakt 2012". Undersøkelsen er gjennomført av Statistisk sentralbyrå (SSB). Data er tilrettelagt og stilt til disposisjon i anonymisert form av Norsk samfunnsvitenskapelig datatjeneste AS (NSD). Verken SSB eller NSD er ansvarlig for analysen av dataene eller de tolkninger som er gjort her."

3) sende NSD/Bergen kopi av eventuelle rapporter/publikasjoner som er utarbeidet på basis av dataene. Dette kan enten være en elektronisk versjon eller tre eksemplarer i papirformat. Disse vil refereres til på våre nettsider og kan gjøres tilgjengelig på nett, om det er ønskelig.

4) slette eller levere datafilen(e) tilbake til NSD etter endt prosjekt eller senest 05-02-2016.

Jeg er kjent med at forskeres taushetsplikt er regulert i forvaltningslovens §13e. Jeg er videre kjent med at forsettlig eller uaktsomt brudd på taushetsplikten, eller medvirkning til dette, kan straffes med bøter eller fengsel.

Sted Oslo Dato 10.02.2014

Underskrift Jana Pohl

Tilgangen refererer til tillatelse nr. 3290, og gjelder følgende prosjekt:

Formål: Master Thesis

Avdelingskontorer / District Offices:
OSLO: NSD, Universitetet i Oslo, Postboks 1055 Blindern, 0316 Oslo. Tel: +47-22 85 52 11. nsd@uio.no
TRONDHEIM: NSD, Norges teknisk-naturvitenskapelige universitet, 7491 Trondheim. Tel: +47-73 59 19 07. kyrre.svarva@svt.ntnu.no
TROMSØ: NSD, HSL, Universitetet i Tromsø, 9037 Tromsø. Tel: +47-77 64 61 53. solvi.anderssen@uit.no

X

Norsk samfunnsvitenskapelig datatjeneste AS
NORWEGIAN SOCIAL SCIENCE DATA SERVICES

Harald Hårfagres gate 29
N-5007 Bergen
Norway
Tel: +47-55 58 21 17
Fax: +47-55 58 96 50
nsd@nsd.uib.no
www.nsd.uib.no
Org.nr. 985 321 884

Veiledererklæring

Navn: Eline Aas
Arbeidssted: Universitetet i Oslo

Jeg erklærer med dette at jeg er oppnevnt som veileder for

Jana Pohl

som har fått tilgang til data fra følgende undersøkelse(r):

Levekårsundersøkelsen om helse, omsorg og sosial kontakt 2012

Jeg er kjent med at de data som er utlevert fra NSD til dette studentarbeidet skal tilbakeleveres eller destrueres etter bruk.

Sted Oslo Dato 14/2-14

Underskrift Eline Aas

Tilgangen refererer til tillatelse nr. 3290, og gjelder følgende prosjekt:

Formål: Master Thesis

Avdelingskontorer / District Offices:
OSLO: NSD, Universitetet i Oslo, Postboks 1055 Blindern, 0316 Oslo. Tel: +47-22 85 52 11. nsd@uio.no
TRONDHEIM: NSD, Norges teknisk-naturvitenskapelige universitet, 7491 Trondheim. Tel: +47-73 59 19 07. kyrre.svarva@svt.ntnu.no
TROMSØ: NSD, HSL, Universitetet i Tromsø, 9037 Tromsø. Tel: +47-77 64 61 53. solvi.anderssen@uit.no

2 Mental Health Outcomes

Mental health is assessed in 5 different dimensions. The proportion of respondents in the different response categories differs significantly across dimensions in both groups. Correlations between all dimensions are significant on 1% level for both groups. They all represent different, not perfectly correlated aspects of overall mental health.

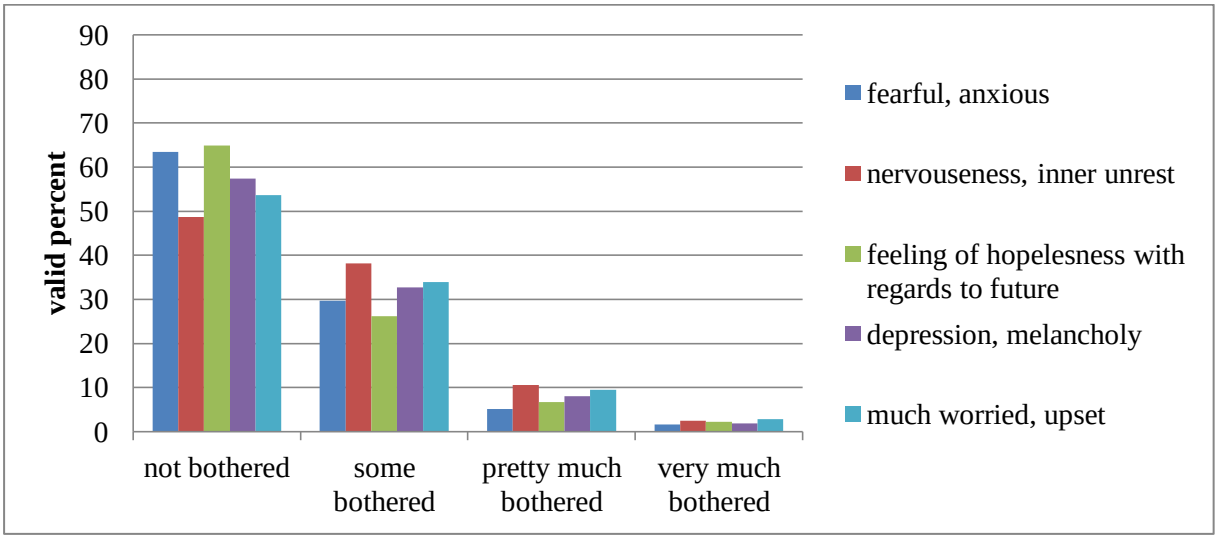

Figure 6 - Valid percent of breast cancer survivors in response categories stratified by mental health dimensions

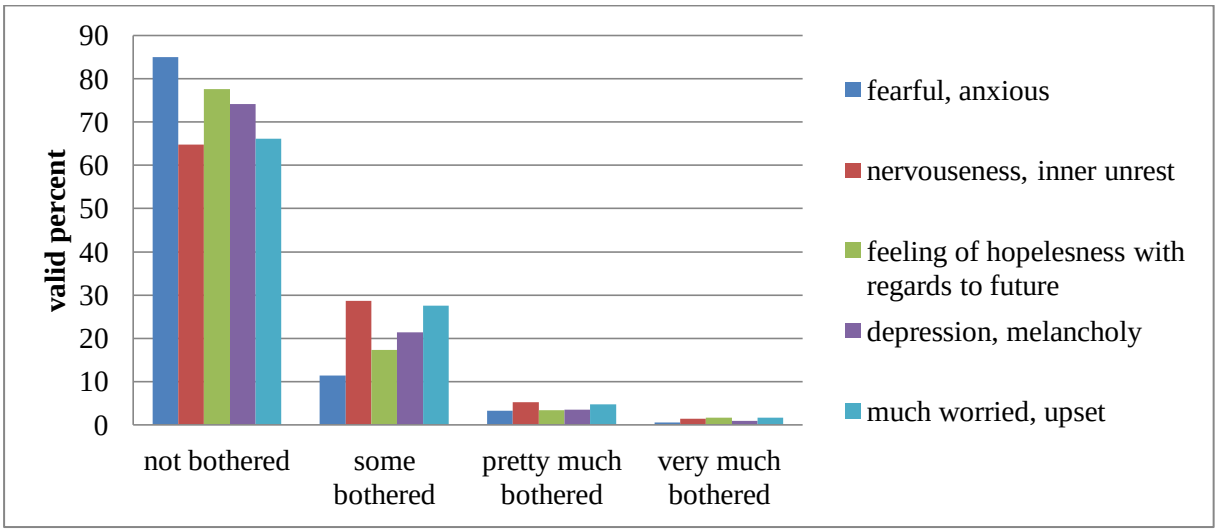

Figure 7 - Valid percent of the general population in response categories stratified by mental health dimensions

3 Correlations

Correlations are based on Pearson correlations. Indicated are correlation coefficients and significance levels. Significance levels are symbolized as: *<0.1, **<0.05, ***<0.01, ****<0.001

Table 4 - Correlation SES and social network with health outcomes for both groups

Variables	Global self-rated health		Mental health (threshold 7)	
	Breast Cancer Survivors	General Population	Breast Cancer Survivors	General Population
Income	.012	-.168****	.029	-.236****
Education	-.046	.203****	.012	.005
Employment	-.038	.377****	.010	.184****
Number of friends	-.007	.004	.002	.086***
Participation in organizations	.029	.182****	.034	.077**
Living with a partner	-.021	.038	.019	.072**

Table 5 - Correlation SES, social network variables and age for breast cancer survivors

Variables	Age	Income	Education	Employment	Number of friends	Participation in organizations	Living with a partner
Age		-.167****	-.218****	-.240****	.015	.100****	-.153****
Income	-.167****		.438****	.404****	-.088****	.029	-.026
Education	-.218****	.438****		.199****	.071***	.075***	-.001
Employment	-.240****	.404****	.199****		.113****	.024	.090****
Number of friends	.015	-.088****	.071***	.113****		.167****	.043*
Participation in organizations	.100****	.029	.075***	.024	.167****		.049**
Living with a partner	-.153****	-.026	-.001	.090****	.043*	.049**	

Table 6 - Correlation SES, social network variables and age for the general population

Variables	Age	Income	Education	Employment	Number of friends	Participation in organizations	Living with a partner
Age		-.086***	-.172****	-.408****	-.081***	-.099****	-.047*
Financial Problems	-.086***		-.056*	-.089***	.012	-.010	-.181****
Education	-.172****	-.056*		.224****	.094****	.179****	.080***
Employment	-.408****	-.089***	.224****		.067**	.098****	.054**
Number of friends	-.081***	.012	.094****	.067**		.113****	.040
Participation in organizations	-.099****	-.010	.179****	.098****	.113****		.050*
Living with a partner	-.047*	-.181****	.080***	.054**	.040	.050*	

4 Regressions Age and Region

Logistic regression results are shown in Odds Ratios (OR) with 95 % Confidence intervals below. Significance levels are based on two-tailed Wald tests and indicated as: *<0.1, **<0.05, ***<0.01, ****<0.001. Unadjusted results refer to simple regressions; adjusted results are based on regressions with age and region combined as independent variables.

Table 7 - Logistic regression results for global self-rated health with age and region

Variable	Categories	Breast Cancer Survivors		General Population	
		Unadj. OR	Adjusted OR	Unadj. OR	Adjusted OR
Age in groups *Reference group: 60 to 69 years*	40 to 49	0.09 (0.67;1.14)	0.87 (0.66;1.14)	1.96**** (1.45;2.65)	1.97**** (1.45;2.67)
	50 to 59	0.85 (0.68;1.05)	0.85 (0.69;1.05)	1.54*** (1.16;2.04)	1.54*** (1.16;2.05)
Region of residence *Reference group: Nord-Norge*	Akershus and Oslo	1.14 (0.82;1.59)	1.14 (0.52;1.58)	1.36 (0.87;2.12)	1.33 (0.85;2.08)
	Øst- and Sørlandet	1.11 (0.81;1.52)	1.10 (0.80;1.52)	1.33 (0.86;2.03)	1.37 (0.89;2.11)
	Vestlandet	1.17 (0.84;1.62)	1.17 (0.84;1.62)	1.34 (0.88;2.06)	1.37 (0.89;2.10)
	Midt Norge	0.911 (0.58;1.42)	0.91 (0.58;1.42)	1.22 (0.70;2.13)	1.23 (0.70;2.15)
Omnibus Chi^2			4.42		22.45***
- 2 Log likelihood			2347.71		1584.24
Nagelkerke R^2			.003		.023

Table 8 - Logistic regression results for mental health (threshold 7) for age and region

Variable	Categories	Breast Cancer Survivors		General Population	
		Unadj. OR	Adjusted OR	Unadj. OR	Adjusted OR
Age in groups ***Reference group: 60 to 69 years***	40 to 49	0.85 (0.64;1.13)	0.84 (0.64;1.12)	0.73* (0.51;1.03)	0.72* (0.50;1.01)
	50 to 59	0.89 (0.71;1.11)	0.88 (0.71;1.11)	0.82 (0.58;1.16)	0.81 (0.58;1.14)
Region of residence ***Reference group: Nord-Norge***	Akershus and Oslo	1.02 (0.72;1.44)	1.01 (0.72;1.43)	0.74 (0.42;1.31)	0.75 (0.42;1.32)
	Øst- and Sørlandet	0.86 (0.61;1.20)	0.86 (0.61;1.20)	0.61* (0.35;1.05)	0.60* (0.35;1.04)
	Vestlandet	0.97 (0.69;1.37)	0.97 (0.69;1.37)	0.96 (0.55;1.68)	0.96 (0.55;1.68)
	Midt Norge	0.70 (0.44;1.13)	0.70 (0.44;1.13)	0.88 (0.44;1.76)	0.88 (0.44;1.77)
Omnibus Chi^2			5.67		11.37*
- 2 Log likelihood			2119.42		1192.01
Nagelkerke R^2			.005		.016

5 Sensitivity Analyses

Sensitivity Analyses are performed by logistic regressions with varying thresholds for the binary outcome variables self-rated global and mental health. Results are reported in Odds Ratios (OR) with 95 % Confidence intervals below. Significance levels are based on two-tailed Wald tests and indicated as: *<0.1, **<0.05, ***<0.01, ****<0.001. Unadjusted results refer to simple regressions with one variable at a time; adjusted results are based on regressions with all SES variables combined as independent variables.

5.1 Global Self-rated Health

For global self-rated health, there are two thresholds investigated. The analyzed low threshold also codes the neutral health state as good health while the high threshold only codes very good health as good health.

Table 9 - Logistic regression results for global self-rated health low threshold (good, very good and neutral health state coded as good health and bad, very bad health coded as bad health state)

Variable	Categories	Breast Cancer Survivors		General Population	
		Unadj. OR	Adjusted OR	Unadj. OR	Adjusted OR
Income (in NOK 100 000) ***Reference group: 2 to 3.999 no financial problems***	Less than 1	0.62 (0.31;1.26)	0.33*** (0.15;0.73)		
	1 to 1.999	0.96 (0.61;1.50)	0.74 (0.45;1.22)		
	4 to 5.999	1.00 (0.61;1.64)	1.03 (0.60;1.75)		
	6 or more	0.84 (0.32;2.21)	0.78 (0.287;2.12)		
	Financial problems			0.23**** (0.11;0.46)	0.45* (0.19;1.10)

Education ***Reference group: University more than 4 years***	Middle school	1.06 (0.59;1.90)	1.12 (0.57;2.20)	0.37*** (0.16;0.85)	0.41 (0.12;1.39)
	High school	0.84 (0.50;1.41)	0.83 (0.46;1.47)	0.98 (0.42;2.26)	1.05 (0.31;3.50)
	University up to 4 years	0.80 (0.47;1.34)	0.76 (0.44;1.33)	1.21 (0.51;2.86)	0.70 (0.21;2.36)
Employment status ***Reference group: not working***	Working at point of survey	0.52** (0.30;0.90)	0.42*** (0.23;0.80)	13.10**** (8.13;21.1)	16.41**** (8.75;30.8)
Number of friends ***Reference group: 5 or more friends***	0 to 2	1.33 (0.63;2.82)	1.46 (0.64;3.28)	0.52* (0.26;1.04)	1.10 (0.40;3.01)
	3 or 4	0.87 (0.60;1.27)	0.88 (0.60;1.30)	0.77 (0.52;1.13)	0.90 (0.54;1.50)
Participation in organizations ***Reference group: not participating***	Participation in organizations	1.17 (0.82;1.66)	1.17 (0.81;1.71)	2.42**** (1.65;3.54)	2.21*** (1.30;3.76)
Living situation ***Reference group: not with a partner***	Living with a partner	0.93 (0.56;1.53)	0.94 (0.55;1.71)	1.15 (0.76;1.74)	0.80 (0.45;1.44)
Omnibus Chi^2			22.37		154.93****
- 2 Log likelihood			955.09		470.12
Nagelkerke R^2			.03		.304

Table 10 - Logistic regression results for global self-rated health high threshold (very good health state coded as good health and good, neutral, bad, very bad health coded as bad health state)

Variable	Categories	Breast Cancer Survivors		General Population	
		Unadj. OR	Adjusted OR	Unadj. OR	Adjusted OR
Income (in NOK 100 000) ***Reference group: 2 to 3.999 no financial problems***	Less than 1	0.94 (0.51;1.76)	0.96 (0.49;1.88)		
	1 to 1.999	0.98 (0.70;1.37)	0.96 (0.67;1.39)		
	4 to 5.999	1.06 (0.74;1.51)	1.21 (0.83;1.76)		
	6 or more	0.94 (0.45;2.00)	0.96 (0.43;2.17)		
	Financial problems			0.41** (0.20;0.84)	0.55 (0.26;1.19)
Education ***Reference group: University more than 4 years***	Middle school	1.21 (0.81;1.81)	1.33 (0.85;2.10)	0.44*** (0.27;0.73)	0.62 (0.34;1.16)
	High school	1.01 (0.69;1.46)	1.13 (0.75;1.70)	0.59** (0.38;0.91)	0.68 (0.40;1.14)
	University up to 4 years	0.84 (0.57;1.23)	0.90 (0.60;1.35)	0.99 (0.64;1.52)	1.00 (0.60;1.69)
Employment status ***Reference group: not working***	Working at point of survey	1.01 (0.73;1.42)	1.00 (0.68;1.48)	3.71**** (2.74;5.02)	3.23**** (2.27;4.61)
Number of friends ***Reference group: 5 or more friends***	0 to 2	1.00 (0.60;1.66)	1.12 (0.66;1.89)	0.37*** (0.20;0.68)	0.58 (0.27;1.23)
	3 or 4	1.21 (0.92;1.60)	1.22 (0.92;1.62)	0.56 (0.44;0.72)	0.63 (0.47;0.84)
Participation in organizations ***Reference group: not participating***	Participation in organizations	1.21 (0.92;1.58)	1.20 (0.91;1.60)	2.18**** (1.61;2.95)	1.87*** (1.30;2.70)
Living situation ***Reference group: not with a partner***	Living with a partner	0.74 (0.53;1.04)	0.73 (0.51;1.03)	1.08 (0.83;1.40)	0.90 (0.66;1.24)

Omnibus Chi^2		17.26		119.18****
- 2 Log likelihood		1546.16		1276.40
Nagelkerke R^2		.017		.144

5.2 Mental Health

For mental health, three additional thresholds based on the sum of mental health problems ranging from 5 to 20 are analyzed. A high threshold of 5 characterizes those entirely without mental problems. A threshold of 10 indicates being bothered by some problems or being bothered a lot by few dimensions. A low threshold of 15 differentiates those who are bothered a lot by mental health problems.

Table 11 - Logistic regression results for mental health threshold 5 indicating those completely without mental health problems

Variable	Categories	Breast Cancer Survivors		General Population	
		Unadj. OR	Adjusted OR	Unadj. OR	Adjusted OR
Income (in NOK 100 000) ***Reference group: 2 to 3.999 no financial problems***	Less than 1	1.06 (0.62;1.79)	1.06 (0.59;1.92)		
	1 to 1.999	1.12 (0.84;1.49)	1.01 (0.79;1.50)		
	4 to 5.999	1.23 (0.91;1.66)	1.16 (0.84;1.61)		
	6 or more	1.11 (0.58;2.10)	0.90 (0.49;1.80)		
	Financial problems			0.07**** (0.20;0.21)	0.50**** (0.12;0.21)
Education ***Reference group: University more than 4 years***	Middle school	0.84 (0.60;1.18)	0.80 (0.55;1.18)	1.48 (0.84;2.60)	2.38*** (1.30;4.34)
	High school	0.71** (0.52;0.97)	0.70** (0.50;0.99)	1.70** (1.03;2.83)	2.05*** (1.21;3.34)
	University up to 4 years	0.69** (0.50;1.94)	0.71** (0.51;0.99)	1.68** (1.01;2.80)	1.82** (1.08;3.10)
Employment status ***Reference group: not working***	Working at point of survey	1.04 (0.78;1.39)	1.00 (0.71;1.41)	2.01**** (1.50;2.68)	1.89**** (1.39;2.60)

Number of friends ***Reference group: 5 or more friends***	0 to 2	0.90 (0.58;1.39)	0.92 (0.58;1.47)	0.49** (0.27;0.90)	0.63 (0.33;1.20)
	3 or 4	1.08 (0.85;1.37)	1.09 (0.85;1.40)	0.85 (0.66;1.10)	0.90 (0.69;1.17)
Participation in organizations ***Reference group: not participating***	Participation in organizations	1.16 (0.92;1.46)	1.10 (0.86;1.40)	1.38** (1.03;1.85)	1.34* (0.98;1.84)
Living situation ***Reference group: not with a partner***	Living with a partner	1.29 (0.95;1.78)	1.23 (0.90;1.71)	1.25 (0.95;1.65)	1.06 (0.79;1.43)
Omnibus Chi^2			14.16		88.75****
- 2 Log likelihood			1873.98		1393.50
Nagelkerke R^2			.013		.106

Table 12 - Logistic regression results for mental health threshold 10 indicating those who are mainly some bothered

Variable	Categories	Breast Cancer Survivors		General Population	
		Unadj. OR	Adjusted OR	Unadj. OR	Adjusted OR
Income (in NOK 100 000) ***Reference group: 2 to 3.999 no financial problems***	Less than 1	0.96 (0.78;1.94)	0.78 (0.36;1.71)		
	1 to 1.999	1.05 (0.71;1.55)	1.01 (0.66;1.55)		
	4 to 5.999	1.13 (0.74;1.73)	1.19 (0.76;1.88)		
	6 or more	0.75 (0.34;1.67)	0.73 (0.32;1.69)		
	Financial problems			0.16**** (0.08;0.31)	0.19**** (0.09;0.39)
Education ***Reference group: University more than 4 years***	Middle school	1.30 (0.81;2.09)	1.27 (0.75;2.18)	0.57 (0.23;1.42)	1.08 (0.40;2.90)
	High school	0.91 (0.60;1.38)	0.91 (0.57;1.44)	1.19 (0.50;2.84)	1.58 (0.64;3.92)
	University up to 4 years	1.03 (0.67;1.57)	1.05 (0.67;1.66)	1.39 (0.57;3.40)	1.51 (0.60;3.78)
Employment status ***Reference group: not working***	Working at point of survey	0.85 (0.57;1.27)	0.79 (0.49;1.27)	3.21**** (1.95;5.26)	2.59**** (1.52;4.39)
Number of friends ***Reference group: 5 or more friends***	0 to 2	0.85 (0.49;1.48)	0.78 (0.44;1.39)	0.31*** (0.13;0.72)	0.55 (0.22;1.40)
	3 or 4	0.96 (0.70;1.32)	0.93 (0.67;1.29)	0.57** (0.36;0.92)	0.72 (0.43;1.19)
Participation in organizations ***Reference group: not participating***	Participation in organizations	1.02 (0.75;1.38)	1.05 (0.76;1.44)	2.42**** (1.50;3.90)	2.18*** (1.30;3.67)
Living situation ***Reference group: not with a partner***	Living with a partner	1.19 (0.80;1.76)	1.22 (0.81;1.84)	1.46 (0.90;2.37)	0.95 (0.55;1.64)

Omnibus Chi^2		12.63		67.02****
- 2 Log likelihood		1229.72		516.76
Nagelkerke R^2		.015		.144

Table 13 - Logistic regression results for mental health threshold 15 indicating those who are mainly bothered

Variable	Categories	Breast Cancer Survivors		General Population	
		Unadj. OR	Adjusted OR	Unadj. OR	Adjusted OR
Income (in NOK 100 000) ***Reference group: 2 to 3.999 no financial problems***	Less than 1	0.62 (0.18;2.13)	0.29* (0.07;1.23)		
	1 to 1.999	1.13 (0.48;2.65)	0.76 (0.30;1.90)		
	4 to 5.999	0.79 (0.33;1.88)	0.88 (0.35;2.25)		
	6 or more	0.45 (0.10;2.03)	0.54 (0.11;2.58)		
	Financial problems			0.09**** (0.03;0.29)	0.10*** (0.03;0.43)
Education ***Reference group: University more than 4 years***	Middle school	2.70* (1.00;7.29)	2.23 (0.71;6.96)	Observations missing*	Observations missing*
	High school	1.47 (0.66;3.26)	1.31 (0.52;3.29)	Observations missing*	Observations missing*
	University up to 4 years	1.87 (0.80;4.40)	1.71 (0.67;4.39)	Observations missing*	Observations missing*
Employment status ***Reference group: not working***	Working at point of survey	0.72 (0.29;1.76)	0.45 (0.14;1.39)	3.21**** (1.95;5.26)	6.01*** (1.61;22.9)
Number of friends ***Reference group: 5 or more friends***	0 to 2	0.91 (0.27;3.31)	0.81 (0.23;2.83)	0.47 (0.06;3.99)	1.53 (0.14;17.0)
	3 or 4	0.77 (0.40;1.49)	0.67 (0.34;1.32)	0.82 (0.26;2.58)	1.76 (0.47;6.67)
Participation in organizations ***Reference group: not participating***	Participation in organizations	1.08 (0.57;2.07)	1.19 (0.60;2.34)	3.30** (1.12;9.79)	5.07** (1.37;18.8)

Living situation ***Reference group: not with a partner***	Living with a partner	1.62 (0.76;3.47)	1.98 (0.90;4.36)	3.40** (1.14;10.1)	1.70 (0.46;6.26)
Omnibus Chi^2			13.81		42.09****
- 2 Log likelihood			366.34		98.43
Nagelkerke R^2			.041		.313

*= Due to only 14 (1%) observations that are above threshold 15 in the general population, not all combinations for education contain observations, so that no numbers can be retrieved.

6 Disease Variables

Logistic regression results are reported in Odds Ratios (OR) with 95 % Confidence Intervals below. Significance levels in regressions are based on two-tailed Wald tests, in descriptives on Pearson Chi^2 tests and indicated as: *<0.1, **<0.05, ***<0.01, ****<0.001. Unadjusted results refer to simple regressions with one variable at a time; adjusted results are based on regressions with all SES variables combined as independent variables.

6.1 Breast Cancer Survivors

6.1.1 Treatment Options

On average, patients have received 3.6 different types of treatment. The most frequently reported treatment is radiation with 76%, followed by removal of more than two lymph nodes with 55.6% and chemotherapy with 55.0%. The given treatment options seem to cover the received treatment well since only 11.3% have received another treatment. There are no significant differences in health outcomes between treatment methods. For SES variables, differences are especially prominent for those receiving chemotherapy and those on long term medication. One third of the sample has received both types of treatment. They are on average of higher SES with higher education and more friends; they are more likely to live with a partner and to work. 79.7% report having received rehabilitation. Those are on average of higher SES as well but without significant health differences. Also, the 5.4% experiencing metastases after the first treatment show no significant health differences.

One might suspect that self-rated health outcomes depend on the severity of the experienced treatment. More aggressive treatment strategies also indicate a more severe case of the disease. 44.8% of all breast cancer survivors received one type of surgery (breast removing or preserving). 54.7% experienced complex and aggressive treatment with surgery and chemotherapy. 0.5% do not fall into one of those categories. Analyses (Figure 8) show that in comparison, health outcomes do not differ significantly for self-rated global as well as for mental health.

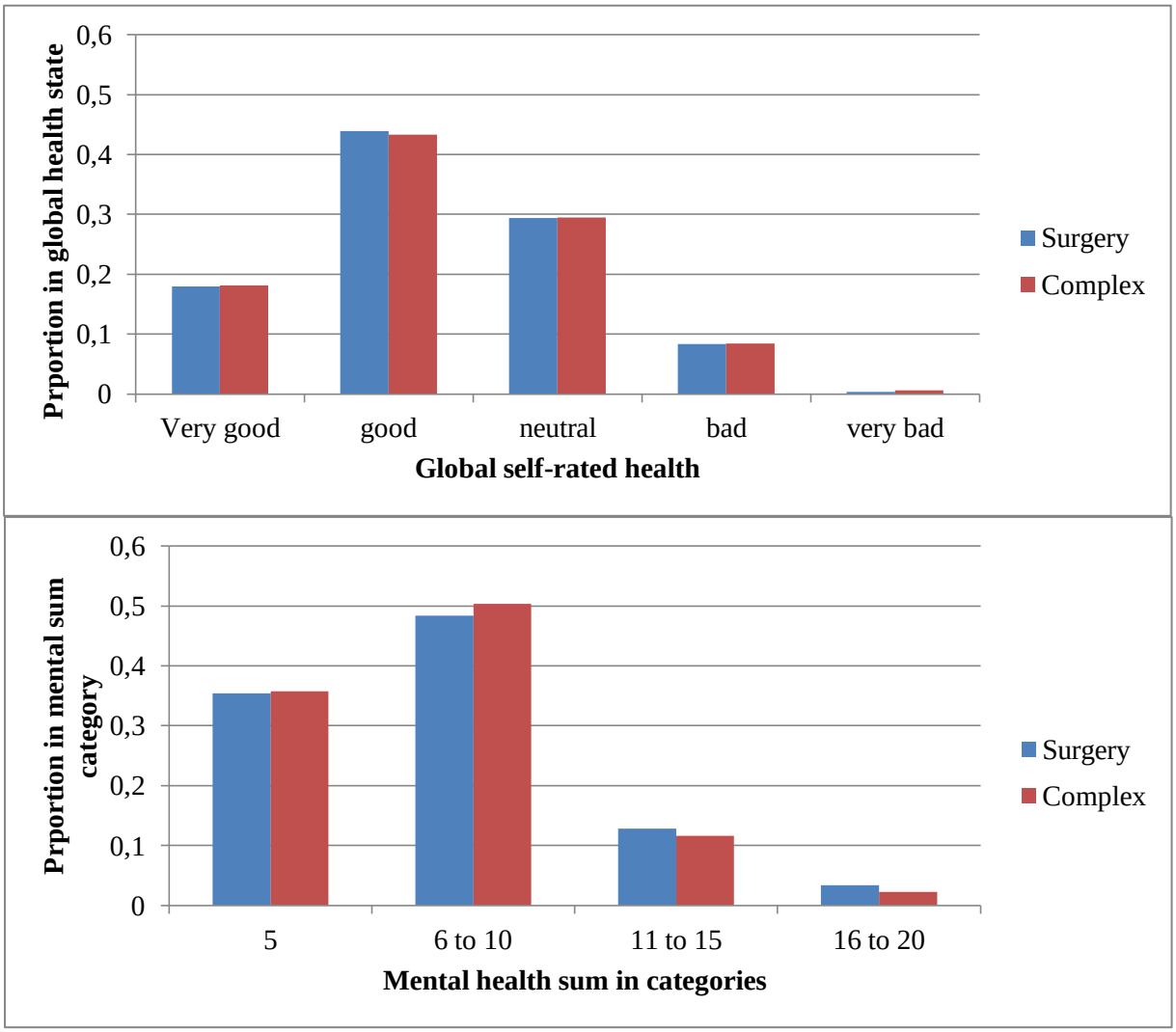

Figure 8 - Health outcomes for different treatment options in response categories

6.1.2 Time Since Diagnosis

The average year of diagnosis in the breast cancer group is 2005, so that the median time since diagnosis is four years (mean=4.3 years, standard deviation=2.39) with a range of 0 to 9 years. There are no significant differences in self-rated global or mental health outcomes for different years of treatment. It might be expected that the percentage of people in good health and those not bothered by mental health problems increases the longer the diagnosis is in the past. This might also be suspected to be dependent on the type of treatment since it varies in its physical and psychological impact. The analyses show however, that such a trend cannot be clearly found, treatments seem to be similar and the trend does not show more respondents with positive health outcomes when the treatment is longer within the past (Figure 9). Years 0 and 9 are excluded due to very few observations. For mental health, the variation between recently received treatments is stronger with an overall positive trend, peaking after four years and constantly reducing until year 7. After that, the slope for all strategies gets positive again. For global health, there is a clear drop for those surveyed three years after treatment who seem to constantly experience lower health. Thereafter, strategies vary around the overall average. Respondents receiving less aggressive strategies in form of breast preserving surgery and long term medication report better global health after 5 years and more.

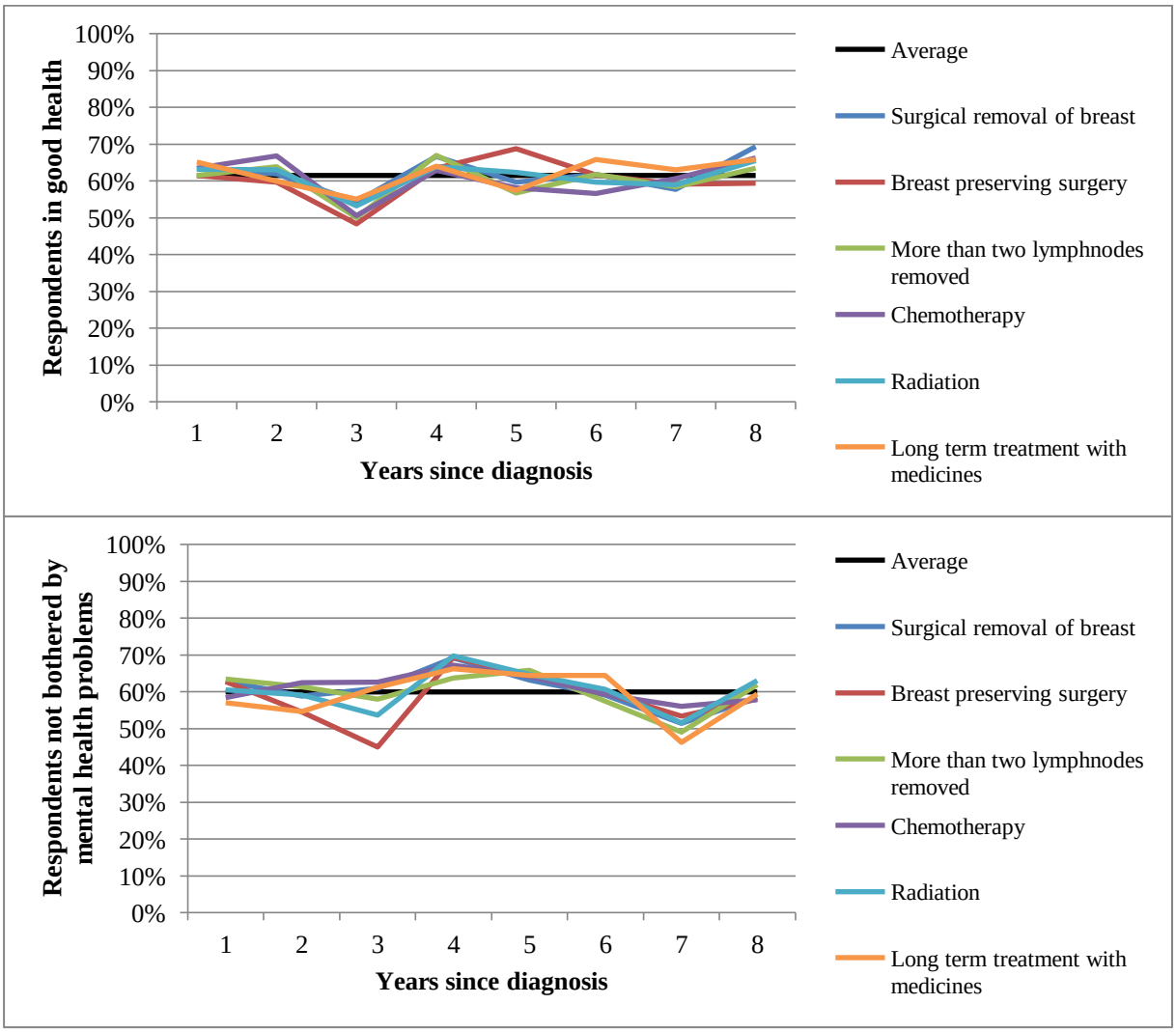

Figure 9 - Respondents in positive health states dependent on time since diagnosis for different treatment strategies

6.1.3 Regression Breast Cancer Treatment

Table 14 - Logistic regression results global self-rated health for breast cancer survivors including disease and treatment variables

Variable	Categories	Unadj. OR	Adjusted OR
Income (in NOK 100 000) ***Reference group: 2 to 3.999***	Less than 1	1.06 (0.65;1.71)	0.83 (0.48;1.44)
	1 to 1.999	0.91 (0.70;1.18)	0.76* (0.56;1.02)
	4 to 5.999	1.21 (0.91;1.45)	1.46** (1.06;2.02)
	6 or more	0.81 (0.46;1.45)	0.85 (0.46;1.58)
Education ***Reference group: University more than 4 years***	Middle school	1.36* (0.99;1.89)	1.62** (1.11;2.35)
	High school	0.97 (0.73;1.31)	1.13 (0.81;1.57)
	University up to 4 years	1.01 (0.75;1.36)	1.01 (0.80;1.52)
Employment status ***Reference group: not working***	Working at point of survey	0.83 (0.64;1.08)	0.76 (0.55;1.06)
Number of friends ***Reference group: 5 or more friends***	0 to 2	1.02 (0.69;1.52)	1.04 (0.68;1.60)
	3 or 4	1.01 (0.81;1.26)	1.00 (0.79;1.26)
Participation in organizations ***Reference group: not participating***	Participation in organizations	1.14 (0.92;1.41)	1.11 (0.89;1.39)
Living situation ***Reference group: not with a partner***	Living with a partner	0.89 (0.67;1.18)	0.90 (0.67;1.22)
Time since diagnosis ***Reference group: 0 years since diagnosis***	Years since diagnosis	1.01 (0.97;1.05)	1.03 (0.99;1.08)

Metastases ***Reference group: no metastases***	Presence of metastases	0.96 (0.63;1.47)	0.92 (0.59;1.45)
Rehabilitation ***Reference group: no rehabilitation received***	Received rehabilitation	1.08 (0.85;1.37)	1.07 (0.82;1.40)
Treatment ***Reference group: surgery only***	Complex (Surgery and chemotherapy)	0.98 (0.81;1.19)	1.05 (0.82;1.33)
	Neither only surgery nor complex	0.31* (0.08;1.24)	0.24* (0.05;1.27)
Omnibus Chi^2			26.69
- 2 Log likelihood			2123.34
Nagelkerke R^2			.022

Table 15 - Logistic regression results mental health (threshold 7) for breast cancer survivors including disease and treatment variables

Variable	Categories	Unadj. OR	Adjusted OR
Income (in NOK 100 000) ***Reference group: 2 to 3.999***	Less than 1	0.75 (0.45;1.25)	0.87 (0.48;1.56)
	1 to 1.999	0.98 (0.74;1.29)	1.05 (0.76;1.44)
	4 to 5.999	1.04 (0.77;1.40)	1.04 (0.75;1.45)
	6 or more	1.39 (0.72;2.68)	1.36 (0.67;2.75)
Education ***Reference group: University more than 4 years***	Middle school	0.91 (0.65;1.28)	0.89 (0.60;1.31)
	High school	0.83 (0.61;1.14)	0.85 (0.60;1.21)
	University up to 4 years	0.88 (0.64;1.20)	0.91 (0.65;1.28)
Employment status ***Reference group: not working***	Working at point of survey	1.09 (0.83;1.44)	1.00 (0.71;1.41)

Number of friends ***Reference group:*** ***5 or more friends***	0 to 2	0.92 (0.61;1.40)	0.96 (0.61;1.51)
	3 or 4	1.00 (0.79;1.27)	1.03 (0.81;1.32)
Part. in organizations ***Reference group:*** ***not participating***	Participation in organizations	1.17 (0.94;1.46)	1.10 (0.87;1.40)
Living situation ***Reference group:*** ***not with a partner***	Living with a partner	1.15 (0.85;1.54)	1.10 (0.80;1.50)
Time since diagnosis ***Reference group:*** ***0 years since diagnosis***	Years since diagnosis	0.98 (0.94;1.03)	0.97 (0.92;1.01)
Metastases ***Reference group:*** ***no metastases***	Presence of metastases	1.05 (0.67;1.65)	1.06 (0.66;1.72)
Rehabilitation ***Reference group:*** ***no rehabilitation received***	Received rehabilitation	1.15 (0.90;1.48)	1.20 (0.91;1.59)
Treatment ***Reference group:*** ***surgery only***	Complex (Surgery and chemotherapy)	1.12 (0.92;1.38)	1.32** (1.03;1.70)
	Neither only surgery nor complex	0.89 (0.24;3.33)	0.94 (0.20;4.39)
Omnibus Chi^2			17.15
- 2 Log likelihood			1928.20
Nagelkerke R^2			.016

6.2 General Population

6.2.1 Descriptives Chronic Disease

Table 16 - Overview of variables in the general population (No= no chronic disease present, Yes= Chronic disease present) Proportion in categories in valid percent, missing excluded. No information on chronic disease from 1 (0.1%) of all respondents, she is excluded here.

				Percent	
Classification	**Category**	**Included Variable**	**Categories**	**No**	**Yes**
Outcome variables	Global self-rated health	*Binary global self-rated health*	Good****	90.0	58.5
			Bad****	10.0	41.5
			Missing	0	0.3
	Mental health 5 symptoms	*Bothered by mental health problems threshold 7*	Not bothered****	83.6	67.1
			Bothered****	16.4	32.9
			Missing	22.8	25.2
Risk adjustment	Age	*Age at point of survey*	40 to 49 years****	37.8	27.6
			50 to 59 years	36.1	36.4
			60 to 69 years****	26.1	36.0
			Missing	0	0
	Region of residence	*Region of residence at point of survey*	Oslo &Akershus	23.1	24.3
			Øst- & Sørlandet	27.4	30.1
			Vestlandet***	33.1	26.7
			Midt Norge	7.6	8.6
			Nord Norge	8.8	10.4
			Missing	0	0
Socioeconomic status	Income	*Financial problems*	Yes***	2.9	6.7
			No***	97.1	93.3
			Missing	22.7	24.6

	Education	*Highest level of education*	Middle school***	13.4	19.4
			High school	42.3	43.6
			University up to 4 years***	35.7	29.8
			University more than 4 years	7.5	7.1
			Missing	1.1	0.1
	Employment status	*Working at point of survey*	Yes****	79.3	56.0
			No****	10.7	44.0
			Missing	0	0
Social network	Friends	*Number of friends*	0 to 2*	4.5	6.3
			3 or 4	39.2	38.3
			5 or more	56.3	55.4
			Missing	0.4	1.3
	Organizations	*Participation in organizations*	Yes***	97.5	94.7
			No***	2.5	5.3
			Missing	0	0
	Living situation	*Living with a partner*	Yes	75.2	74.5
			No	24.8	25.5
			Missing	0	0

6.2.2 Regression Chronic Disease

Table 17 - Logistic regression results global self-rated health for the general population including chronic disease

Variable	Categories	Unadj. OR	Adjusted OR
Income ***Reference group: no financial problems***	Financial problems	0.19**** (0.11;0.34)	0.32*** (0.15;0.67)
Education ***Reference group: University more than 4 years***	Middle school	0.235**** (0.13;1.44)	0.262*** (0.11;0.65)
	High school	0.47** (0.26;0.85)	0.38** (0.16;0.90)
	University up to 4 years	0.87 (0.47;1.61)	0.56 (0.24;1.34)
Employment status ***Reference group: not working***	Working at point of survey	6.45**** (4.84;8.59)	4.82**** (3.32;6.99)
Number of friends ***Reference group: 5 or more friends***	0 to 2	0.63* (0.38;1.05)	0.95 (0.45;2.01)
	3 or 4	0.77* (0.60;1.00)	0.92 (0.65;1.31)
Participation in organizations ***Reference group: not participating***	Participation in organizations	3.24**** (1.87;5.62)	2.1* (0.97;4.55)
Living situation ***Reference group: not with a partner***	Living with a partner	1.22 (0.92;1.60)	0.87 (0.58;1.29)
Chronic disease ***Reference group: not present***	Presence of chronic disease	0.16**** (0.12;0.22)	0.21**** (0.14;0.30)
Omnibus Chi^2			268.42****
- 2 Log likelihood			890.20
Nagelkerke R^2			.334

Table 18 - Logistic regression results mental health for the general population including chronic disease

Variable	Categories	Unadj. OR	Adjusted OR
Income ***Reference group: no financial problems***	Financial problems	0.12**** (0.07;0.23)	0.14**** (0.07;0.28)
Education ***Reference group: University more than 4 years***	Middle school	1.23 (0.67;2.23)	2.90*** (1.46;5.77)
	High school	1.48 (0.87;2.52)	2.06** (1.16;3.67)
	University up to 4 years	1.72* (1.00;2.95)	1.99** (1.11;3.55)
Employment status ***Reference group: not working***	Working at point of survey	3.33**** (2.40;4.63)	2.60**** (1.81;3.73)
Number of friends ***Reference group: 5 or more friends***	0 to 2	0.63* (0.38;1.05)	0.47** (0.24;0.94)
	3 or 4	0.77* (0.60;1.00)	0.63*** (0.46;0.87)
Participation in organizations ***Reference group: not participating***	Participation in organizations	3.45**** (1.85;6.42)	2.96*** (1.44;6.08)
Living situation ***Reference group: not with a partner***	Living with a partner	1.44** (1.05;1.97)	1.18 (0.82;1.68)
Chronic disease ***Reference group: not present***	Presence of chronic disease	0.39**** (0.29;0.52)	0.48**** (0.35;0.66)
Omnibus Chi^2			152.62****
- 2 Log likelihood			1029.45
Nagelkerke R^2			.199

Table 19 - Logistic regression results global self-rated health for the general population stratified by the presence of chronic disease

Variable	Categories	No chronic disease		Chronic disease present	
		Unadj. OR	Adjusted OR	Unadj. OR	Adjusted OR
Income ***Reference group: no financial problems***	Financial problems	0.48 (0.13;1.76)	0.93 (0.16;5.39)	0.16**** (0.07;0.36)	0.24*** (0.10;0.60)
Education ***Reference group: University more than 4 years***	Middle school	0.07** (0.01;0.56)	0.24* (0.09;1.01)	0.27**** (0.13;0.56)	0.39* (0.14;1.10)
	High school	0.13** (0.02;0.99)	0.58 (0.16;2.15)	0.53* (0.27;1.07)	0.57 (0.22;1.57)
	University up to 4 years	0.24 (0.03;1.88)	0.59 (0.11;1.95)	0.93 (0.45;1.90)	0.78 (0.30;2.03)
Employment status ***Reference group: not working***	Working at point of survey	5.68**** (3.25;9.92)	6.01**** (2.96;12.2)	5.00**** (3.49;7.17)	4.37**** (2.80;6.82)
Number of friends ***Reference group: 5 or more friends***	0 to 2	0.51 (0.18;1.42)	0.67 (0.19;2.38)	0.70 (0.36;1.34)	1.08 (0.43;2.71)
	3 or 4	0.67 (0.41;1.11)	1.20 (0.62;2.31)	0.75* (0.54;1.05)	0.88 (0.57;1.35)
Participation in organizations ***Reference group: not participating***	Participation in organizations	4.85*** (1.75;13.4)	2.14 (0.55;8.31)	2.35** (1.16;4.75)	2.02 (0.79;5.16)
Living situation ***Reference group: not with a partner***	Living with a partner	0.72 (0.40;1.31)	0.39** (0.16;0.92)	1.52** (1.06;2.16)	1.10 (0.68;1.78)
Omnibus Chi^2			58.25****		96.50****
- 2 Log likelihood			296.58		572.38
Nagelkerke R^2			.209		.237

Table 20 - Logistic regression results mental health for the general population stratified by the presence of chronic disease

Variable	Categories	No chronic disease		Chronic disease present	
		Unadj. OR	Adjusted OR	Unadj. OR	Adjusted OR
Income ***Reference group: no financial problems***	Financial problems	0.21*** (0.08;0.57)	0.19*** (0.06;0.56)	0.09**** (0.04;0.34)	0.10**** (0.04;0.28)
Education ***Reference group: University more than 4 years***	Middle school	2.79** (1.09;7.13)	4.80*** (1.71;13.5)	0.77 (0.32;1.82)	1.88 (0.70;5.01)
	High school	2.44** (1.16;5.13)	3.56*** (1.49;7.14)	0.95 (0.43;2.10)	1.25 (0.53;2.95)
	University up to 4 years	2.68** (1.26;5.70)	2.84*** (1.29;6.23)	1.13 (0.50;2.54)	1.34 (0.56;3.20)
Employment status ***Reference group: not working***	Working at point of survey	3.06**** (1.75;5.63)	3.13**** (1.70;5.76)	2.68**** (1.75;4.11)	2.29**** (1.45;3.63)
Number of friends ***Reference group: 5 or more friends***	0 to 2	0.51 (0.18;1.42)	0.20*** (0.08;0.53)	0.70 (0.36;1.34)	0.95 (0.35;2.54)
	3 or 4	0.67 (0.41;1.11)	0.55** (0.33;0.31)	0.75* (0.54;1.05)	0.73 (0.47;1.15)
Participation in organizations ***Reference group: not participating***	Participation in organizations	2.21 (0.67;7.31)	1.12 (0.29;4.46)	3.54*** (1.63;7.71)	4.88*** (1.92;12.4)
Living situation ***Reference group: not with a partner***	Living with a partner	1.03 (0.61;1.72)	0.95 (0.54;1.67)	1.89*** (1.24;2.87)	1.34 (0.83;2.18)
Omnibus Chi^2			51.59****		78.15****
- 2 Log likelihood			462.78		551.57
Nagelkerke R^2			.145		.202

7 Missing Values

Differences in SES are indicated for the two variables mental health and financial problems with many missing values. Significant differences in descriptives are based on Pearson Chi^2 tests and significance levels in logistic regressions on two-tailed Wald tests. They are indicated as: *<0.1, **<0.05, ***<0.01, ****<0.001.

7.1 Mental Health

For the five dimensions of mental health, 23.9% of the general population and 12.3% of the breast cancer survivors do not answer all questions on mental health.

Table 21 - Overview breast cancer survivors stratified by missing mental health values (No= no answers on mental health missing Yes= answer(s) on mental health missing). Percent in valid percent, missing excluded

				Percent	
Classification	**Category**	**Included Variable**	**Categories**	**No**	**Yes**
Risk adjustment	Age	*Age at point of survey*	40 to 49 years	19.4	18.9
			50 to 59 years	43.5	44.6
			60 to 69 years	37.1	36.5
			Missing	0.3	0.4
	Region of residence	*Region of residence at point of survey*	Oslo & Akershus	25.1	27.5
			Øst- & Sørlandet	29.5	32.4
			Vestlandet	25.6	22.5
			Midt Norge	6.8	6.8
			Nord Norge	13.1	10.8
			Missing	0.3	0.4

Socioeconomic status	Income	*Annual gross income at point of diagnosis (in NOK 100 000)*	Less than 1	4.1	5.4
			1 to 1.999	17.2	17.5
			2 to 3.999	58.6	57.4
			4 to 5.999	14.9	13.0
			6 or more	2.7	3.6
			Missing	0	0
	Education	*Highest level of education*	Middle school	22.5	26.2
			High school	31.6	33.5
			University up to 4 years	29.0	26.7
			University more than 4 years	17.0	13.6
			Missing	1.1	0.9
	Employment status	*Working at point of survey*	Yes	82.9	81.5
			No	16.8	18.5
			Missing	0.3	0.4
Social network	Friends	*Number of friends*	0 to 2	6.6	6.9
			3 or 4	26.9	24.9
			5 or more	66.5	68.2
	Organizations	*Participation in organizations*	Yes	68.8	68.7
			No	31.2	34.3
			Missing	2.3	3.1
	Living situation	*Living with a partner*	Yes	86.0	84.5
			No	14.0	15.5
			Missing	0.6	1.8

Table 22 - Overview general population stratified by missing mental health values (No= no answers on mental health missing Yes= answer(s) on mental health missing). Proportion in categories in valid percent, missing excluded

				Percent	
Classification	**Category**	**Included Variable**	**Categories**	**No**	**Yes**
Risk adjustment	Age	*Age at point of survey*	40 to 49 years****	30.4	41.1
			50 to 59 years	33.6	37.0
			60 to 69 years****	15.0	21.9
			Missing	0	0
	Region of residence	*Region of residence at point of survey*	Oslo & Akershus*	22.7	26.8
			Øst- & Sørlandet	29.2	26.8
			Vestlandet	30.5	28.6
			Midt Norge	8.3	7.3
			Nord Norge	9.2	10.5
			Missing	0	0
Socioeconomic status	Income	*Financial problems*	Yes	95.4	93.3
			No	4.6	6.7
			Missing	0.9	0
	Education	*Highest level of education*	Middle school***	15.0	20.8
			High school	43.1	43.6
			University up to 4 years	27.1	27.6
			University more than 4 years***	14.6	8.0
			Missing	0.9	1.7
	Employment status	*Working at point of survey*	Yes	67.9	69.4
			No	32.1	30.6
			Missing	0	0

Social network	Friends	*Number of friends*	0 to 2	5.0	6.5
			3 or 4	38.9	38.2
			5 or more	56.1	55.3
			Missing	0.6	1.5
	Organizations	*Participation in organizations*	Yes	96.1	96.5
			No	3.9	3.5
			Missing	0	0
	Living situation	*Living with a partner*	Yes	74.6	75.5
			No	25.4	24.5
			Missing	0	0

7.2 Financial Problems

23.6% of the general population do not reply to the question on financial problems.

7.2.1 Descriptives General Population

Table 23 - Overview general population stratified by missing financial problem values (No= answer on financial problems not missing Yes= answer on financial problems missing). Percent in valid percent, missing excluded.

				Percent	
Classification	**Category**	**Included Variable**	**Categories**	**No**	**Yes**
Outcome variables	Global self-rated health	*Binary global self-rated health*	Good****	77.1	68.8
			Bad****	22.9	31.2
			Missing	0.1	0.3
	Mental health 5 symptoms	*Bothered by mental health problems threshold 7*	Not bothered****	75.9	90.0
			Bothered****	24.1	10.0
			Missing	1.4	97.0
Risk adjustment	Age	*Age at point of survey*	40 to 49 years***	30.3	41.7
			50 to 59 years	35.8	37.6
			60 to 69 years**	33.9	20.7
			Missing	0	0
	Region of residence	*Region of residence at point of survey*	Oslo &Akershus	22.8	26.6
			Øst- & Sørlandet	29.4	26.3
			Vestlandet	30.1	29.9
			Midt Norge	8.4	7.1
			Nord Norge	9.4	10.1
			Missing	0	0

Socioeconomic status	Education	*Highest level of education*	Middle school****	14.6	22.0
			High school**	34.4	42.8
			University up to 4 years	34.9	27.4
			University more than 4 years	7.1	7.8
			Missing	0.4	1.8
	Employment status	*Working at point of survey*	Yes***	67.8	69.8
			No***	32.2	30.2
			Missing	0	0
Social network	Friends	*Number of friends*	0 to 2**	4.9	6.9
			3 or 4	38.8	38.4
			5 or more	56.3	54.7
			Missing	0.6	1.5
	Organizations	*Participation in organizations*	Yes**	96.0	96.7
			No**	4.0	3.3
			Missing	0	0
	Living situation	*Living with a partner*	Yes****	74.7	75.1
			No****	25.3	24.9
			Missing	0	0

7.2.2 Regression

When financial problems are excluded from the analyses, results might change because they are correlated with and might confound other factors. It also allows the analysis of a bigger sample. Results show that the general interpretation of the model does not change but individual variables and significance levels change. The explanatory power is higher for the model including financial problems

Table 24 - Logistic regression results for global self-rated health in the general population with and without financial problems. Results are presented in Odds Ratios and 95% Confidence intervals below.

Variable	Categories	With financial problems	Without financial problems
Education ***Reference group: University more than 4 years***	Middle school	0.29*** (0.11;0.69)	0.37*** (0.19;0.74)
	High school	0.43** (0.19;0.98)	0.54* (0.29;1.03)
	University up to 4 years	0.58 (0.25;1.36)	0.84 (0.44;1.62)
Employment status ***Reference group: not working***	Working at point of survey	6.02**** (4.20;8.63)	5.81**** (4.30;7.86)
Number of friends ***Reference group: 5 or more friends***	0 to 2	1.21 (0.60;2.47)	1.21 (0.74;2.37)
	3 or 4	1.11 (0.79;1.56)	1.04 (0.78;1.38)
Participation in organizations ***Reference group: not participating***	Participation in organizations	2.43**** (1.69;3.50)	2.14 (1.58;2.91)
Living situation ***Reference group: not with a partner***	Living with a partner	0.85 (0.58;1.24)	0.98 (0.72;1.34)
Omnibus Chi^2		204.94****	241.535****
- 2 Log likelihood		956.13	1330.37
Nagelkerke R^2		.262	.234

Table 25 - Logistic regression results mental health (threshold 7) in the general population with and without financial problems. Results are presented in Odds Ratios and 95% Confidence intervals below.

Variable	Categories	With financial problems	Without financial problems
Education ***Reference group: University more than 4 years***	Middle school	2.41** (1.24;4.71)	2.13** (1.12;4.08)
	High school	2.02** (1.14;3.58)	2.02** (1.15;3.56)
	University up to 4 years	1.93** (1.09;3.43)	1.86** (1.05;3.27)
Employment status ***Reference group: not working***	Working at point of survey	2.98**** (2.10;4.24)	3.23**** (2.29;4.56)
Number of friends ***Reference group: 5 or more friends***	0 to 2	0.45** (0.23;0.87)	0.38*** (0.20;0.71)
	3 or 4	0.65** (048;0.90)	0.65*** (0.48;0.90)
Participation in organizations ***Reference group: not participating***	Participation in organizations	1.43* (1.00;2.06)	1.25 (0.95;1.92)
Living situation ***Reference group: not with a partner***	Living with a partner	1.12 (0.79;1.59)	1.38* (0.99;1.93)
Omnibus Chi^2		125.18****	90.18****
- 2 Log likelihood		1054.00	1097.38
Nagelkerke R^2		.166	.120