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## Socioeconomic aspects of unmet healthcare needs and health outcomes - Economic conditions, social capital, unmet healthcare needs, healthcare providers and mortality

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Socioeconomic aspects of unmet healthcare needs and health outcomes  
(Economic conditions, social capital, unmet healthcare needs, healthcare providers  
and mortality)

“Every truth passes through three stages before it is recognized. In the first, it is ridiculed. In the second, it is opposed. In the third, it is regarded as self-evident.”

– Arthur Schopenhauer

# Socioeconomic aspects of unmet healthcare needs and health outcomes

Economic conditions, social capital, unmet healthcare  
needs, healthcare providers and mortality

Christine Lindström



**LUND**  
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DOCTORAL DISSERTATION

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Professor Bo Burström, Department of Public Health Sciences, Karolinska  
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Title and subtitle Socioeconomic aspects of unmet healthcare needs and health outcomes - Economic conditions, social capital, unmet healthcare needs, healthcare providers and mortality		
<p>Socioeconomic status (SES) differences in health are well known. Both material and psychosocial hypotheses regarding these SES differences have been forwarded. Social capital (trust, social participation) may be seen as a contextual and social extension of this debate with access to healthcare as one of the four hypothesized mechanisms between high social capital and health. This thesis investigates material, psychosocial and social capital factors and SES with regard to unmet health care needs, choice of primary care (PC) provider and mortality in ecological and individual level studies.</p> <p>In paper I, social capital (measured as trust), relative income (Gini index) and absolute income (GNP/capita) were examined in models regarding infant mortality rate (IMR), adult mortality rate (25-64 years) and life expectancy (LE), analyzed in models for all countries (23), and 11 rich and 12 poor separately. Social capital contributed little to the information content (adjusted R<sup>2</sup>) of the models for all health outcomes, while Gini index had a high information content for IMR in rich countries and BNP/capita for LE in all countries. This suggests that material factors rather than social capital affect health outcomes in this ecological study.</p> <p>In paper II, socioeconomic differences regarding unmet healthcare needs were investigated using the Public Health Survey in Skåne, 2012, including 28,029 respondents aged 18-80. SES was significantly associated with unmet healthcare needs. There was a clear gradient for unmet healthcare needs among the SES groups, where higher non-manual employees had lower levels of unmet healthcare needs than all other employed groups. Only retired persons had lower unmet healthcare needs than the higher non-manual employees. The unemployed, those on long-term sick leave and unskilled manual workers reported particularly high levels of unmet needs. The SES differences in unmet needs were attenuated when economic stress, trust and self-rated health were introduced in the multiple analyses.</p> <p>In paper III unmet healthcare needs were investigated with regard to primary care (PC) provider. In Sweden, the prevalence of private PC providers has risen dramatically since the reform in 2010, and private providers now constitute approximately 40% of all PC providers. The study-population consisted of respondents from the Public Health Survey in Skåne, 2012, aged 18-80. Differences in unmet healthcare needs were small between public and private providers. The initial lower unmet need in favor of private PC providers, particularly for women, disappeared after adjusting for SES and self-rated health. The SES distribution between the PC types differed, with a higher prevalence of higher non-manual employees and old-age pensioners registered with private PC providers. These two SES groups demonstrated the lowest unmet healthcare needs of all SES groups in paper II.</p> <p>In paper IV the association between unmet needs at baseline and mortality at follow-up 5 years later was investigated. The study population consisted of the respondents from the Public Health Survey Skåne 2008, aged 18-80 (N=28,198). Mortality data was obtained from the National Board of Health and Welfare (Socialstyrelsen). There were 946 deaths during the five-year follow-up period. People with unmet healthcare needs had higher hazard rate ratios (HRRs) of mortality from cancer and from other causes of deaths than cancer and CVD, while no association was seen for CVD. Particularly the older part of the population, 65-80, had higher HRRs if they had presented unmet healthcare needs at baseline.</p>		
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# Socioeconomic aspects of health and healthcare utilization

Economic conditions, social capital, unmet  
healthcare needs, healthcare providers and  
mortality

Christine Lindström



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*To Jesper, for being in my life,  
and to Lennart and Birgitta, for having made it*



# Table of Contents

Table of Contents .....	8
Acknowledgement.....	10
List of abbreviations.....	11
List of papers.....	12
Introduction .....	13
Socioeconomic status and health.....	13
Income and health .....	15
Psychosocial stress theory.....	17
The social capital theory .....	19
Socioeconomic and geographical inequalities in Swedish healthcare .....	20
Healthcare utilization and unmet healthcare needs .....	22
Primary care in Sweden after the reform.....	23
Aims .....	27
General aims.....	27
Specific aims .....	27
Methods.....	29
Study population .....	29
23 countries (paper I).....	29
The public health survey in Skåne 2012 (Paper II-III).....	30
The public health survey in Skåne 2008 (Paper IV).....	31
Definitions.....	33
Dependent variables/Outcomes .....	33
Independent variables/Determinants .....	34
Statistical methods .....	37
Paper I.....	37
Papers II-III .....	37
Paper IV.....	38
Results .....	39
Paper I – Social capital, GNP per capita, relative income and health: an ecological study of 23 countries .....	39

Paper II – SES, social capital and unmet healthcare needs .....	40
Paper III – differences in unmet healthcare needs between public and private PC providers .....	44
Paper IV – unmet healthcare and mortality .....	45
Discussion .....	49
Social versus economic mechanisms and health outcomes.....	49
Assessing unmet healthcare needs .....	51
The SES gradient also evident for unmet healthcare needs .....	52
Public versus private primary care provider.....	53
The effects of unmet healthcare needs .....	54
Strengths and limitations .....	55
Paper I.....	55
Paper II-IV.....	56
Conclusions and future perspectives .....	59
Recommendations, research gaps and future perspectives .....	60
Populärvetenskaplig sammanfattning.....	63
References .....	67

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## List of abbreviations

BMI body mass index

CI confidence interval

CVD cardiovascular disease

GNP gross national product

HRR hazard rate ratio

ICD international statistical classification of diseases

LTPA leisure time physical activity

OR odds ratio

PC primary care

SES socioeconomic status

SRH self-rated health

SUN self-assessed unmet need

WHO world health organization

## List of papers

This thesis is based on the following papers, which are referred to in the text by their Roman numerals.

- I. Lindström C, Lindström M. “Social capital”, GNP per capita, relative income, and health: an ecological study of 23 countries. *International Journal of Health Services*. 2006; 36 (4):679-696.
- II. Lindström C, Rosvall M, Lindström M. Socioeconomic status, social capital and self-reported unmet health care needs: A population-based study. *Scandinavian Journal of Public Health*. 2017 May; 45(3):212-221.
- III. Lindström C, Rosvall M, Lindström M. Differences in unmet healthcare needs between public and private primary care providers: A population-based study. *Scandinavian Journal of Public Health*. E-pub. 2018 Mar 1.
- IV. Lindström C, Rosvall M, Lindström M. Unmet healthcare needs and mortality – a prospective cohort study from southern Sweden. *Submitted*.

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# Introduction

## Socioeconomic status and health

Socioeconomic status (SES) is strongly associated with health (1-4) and healthcare utilization (5-6). The term SES refers to social class/position in a social hierarchy and is often generic to income, education or occupation. The exact causal mechanisms behind the socioeconomic effects on health are not clear, but are considered to be a combination of social/psychosocial/behavioral and material/economic inequality (7). Despite WHO's objective to ensure equal healthcare regardless of SES, gender or ethnical background within a geographical area (8), socioeconomic differences in health remain and only seem to be growing (9-11), also in Sweden (12).

Data is scarce regarding SES differences in life expectancy and mortality prior to the 19th century, but from around the time of the industrial revolution and onwards SES differences in life expectancy have been observed in the UK and later in countries that became industrialized later (1).

The Whitehall study starting in the late 1960s was the first longitudinal study to demonstrate a social gradient in health. Whitehall I, including men only, showed that British civil servants at the bottom level, combined over a 10-year period, were three times more likely to die from cardiovascular diseases and from mortality of all causes than men in top positions. There was a distinct gradient between all levels of employees from the highest level of director-general to the janitor level in the public administration in Whitehall. While the prevalence of smoking and cardiovascular risk factors were higher in the bottom group, it could only account for part of the difference in mortality (2). Further studies have tried to outline if these health differences are dominated by material inequalities or psychosocial pathways but without conclusive results (13). The fact that there is a gradient also between those who are materially well-off may suggest a psychosocial mechanism. This observation triggered the theory regarding psychosocial stress as a mechanism behind SES differences in health.

Whitehall II starting in the 1980s, also included women and demonstrated the same pattern (14). Numerous studies have since shown an inverse association between SES and cardiovascular disease not only in the UK but also in the US, Australia, Scandinavia and the rest of Europe (3, 15-18). It is now well established that occupation, educational level and household income are important predictors of mortality, cardiovascular risk factor levels and morbidity (19-20). In Sweden SES differences in cardiovascular diseases have been evident since the 1980s, and are almost twice as high in the lowest SES groups compared to the highest (21). Different results on mortality depend on whether one uses education or occupation, although the SES-gradient in health is evident for both SES-measures (22). There is data suggesting that the SES differences concerning cardiovascular risk factors are more pronounced in women than in men (23). However, Swedish national statistics indicate that the association between cardiovascular mortality and SES in fact is stronger for men (21). A review on 26 papers found that the SES-gradient was stronger for men than for women for all health outcomes other than heart disease (24).

Several hypotheses regarding the well-known SES differences in health have been presented. The Black Report proposed four such plausible explanations. The artefact explanation states that it is a matter of definition of what is a high and low SES group, and that this definition seems to be dynamic rather than static because the traditional “working class” constitutes a decreasing proportion of the population as educational levels have risen and several manual occupations have decreased in number. The social selection explanation concerns the mobility between the SES groups, resulting in a socioeconomically downward mobility of sick people and a correspondingly upward mobility of healthy people. The materialist/structural explanation emphasizes the role of the economic/materialistic conditions behind social structures. The cultural/behavioral explanation focuses on health related behaviors such as smoking, diet and physical exercise. Although the social selection and artefact explanations cannot be completely ruled out as explanations of the persistent socioeconomic differences in health, the Black Report suggested that most of the differences can be explained by structural/material factors and, to some lesser extent, cultural/behavioral factors (7). Today the distribution of skills, knowledge and resources determined by material conditions and social structures remains the most important approach and explanation of socioeconomic differences in health (25). However, those who are upwardly mobile do not seem to attain the same levels of health as those who are advantaged over the whole life course (26-27). Material (“Income and health”) as well as psychosocial (“Psychosocial stress theory”) factors will be discussed with regard to SES differences in health under the following two headings.

SES differences in health may partly be consequences of political processes and state interference. Strong welfare states which redistribute wealth more equally through taxes, may uphold stronger social cohesion and better health due to general welfare and health insurance. A neo-liberal system is in contrast in principle unconcerned with economic and social inequalities, and SES differences may be exacerbated by the promotion of individualistic rather than collective policies. Increased income inequalities could eventually lead to social fragmentation and poorer population health (28-29).

This thesis investigates social and economic determinants of health and unmet healthcare needs, both in a global and regional perspective, starting with a study that tests the psychosocial and material hypotheses for differences in health outcomes such as life expectancy, adult mortality and infant mortality rate (IMR). The second paper examines socioeconomic differences in unmet healthcare needs in Skåne, while adjusting for social and economic variables. The third paper compares unmet healthcare needs for public and private primary care (PC) providers in Skåne. Finally, in the fourth paper, a longitudinal study examines unmet healthcare needs at baseline and mortality at follow-up five years later.

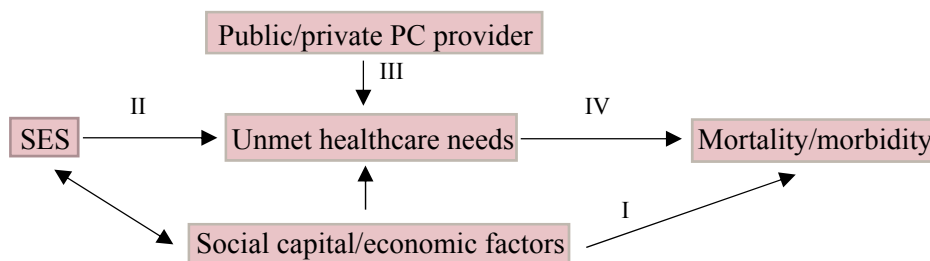


Figure 1: Relations between important variables in the thesis. Roman numerals depict the papers where the associations are analyzed.

## Income and health

Life expectancy has increased dramatically in Sweden and other economically developed countries since the late 18th century. Although some credit economic growth altogether (30), the causes are probably multifactorial and have varied over time in content and relative importance (31-35). A curvilinear relation between income and health is seen globally and within countries (20, 36-37), which means that an increase in income has a greater impact on health and life expectancy in low-income countries than in high-income countries where an increase per se may not be noticeable on health. The hypothesis of absolute income states that the higher



income an individual has, the better the health, independent of the income inequality in that area, and is supported by a considerable body of evidence (38-39). But the fact that life expectancy in high-income countries levels off may point at a diminishing effect of economic growth on health when a certain level of income and wealth is reached. A common argument against the hypothesis of absolute income is that its effect on health in the developed world is declining and close to non-existent as the society develops beyond basic material needs.

In recent decades there has been an intense debate regarding the effects of absolute and relative income. According to the hypothesis of relative income a society with a more egalitarian distribution of income will have a healthier population than one with more unequal distribution. The minority in the top positions, although statistically having better health than people below their rank, are few and therefore do not contribute to the over-all life expectancy as much as if the total wealth would be more equally distributed. Theorists such as Wilkinson and Marmot have popularized ideas that social and economic inequality are harmful to individuals with lower SES (40-44). Individuals in the lower social strata compare themselves with people above them and the national average, and failure to keep up may result in psychosocial stress. This would suggest that poor people not only experience worse health due to material disadvantages but also psychological stress following inferior position in the social system. The hypothesis of relative position is essentially similar to the hypothesis of relative income, although expanding it to social position, for example occupational status or education.

The evidence that income inequality is associated with health is however tenuous. An association has been seen in the US on a state level and for metropolitan areas (45-47), but not for countries with a more developed welfare system such as Canada and Denmark (48-50). The evidence that income inequality affects mortality in the US has later been questioned as the association disappeared when controlling for absolute income (51-52). Although an association was seen between high income inequality areas and higher mortality in Copenhagen, Denmark, it disappeared when adjusting for individual risk factors, while the association remained for individual household income (50). There is also a concern that the association between relative income and mortality on an aggregate level is a statistical artefact, an example of the “ecological fallacy”, and that studies using population data on an aggregate level cannot distinguish between absolute and relative income (53). The same author who had found a strong correlation between income inequality and mortality in 1989 later stated there was no association for other time periods between 1949 and 1999 in the US (54). Other studies have shown that ethnicity and education account for the association between income inequality and health in the US (55-56). A multi-level prospective study based on 500,000 individuals in 50 US states found a robust association between income inequality and mortality for particularly men, and somewhat weaker for women, under the age of 65 after controlling for

compositional factors, including household income, race and education (57). Income inequality has, however, been associated with an increased rate in health-associated conditions, such as teenage births, obesity and mental illness (58-60), and higher crime rates including homicide (61). Countries and states that allow higher income inequality often invest less in human resources and public health amenities (62), which could partly explain an association between income inequality/poverty and health. A longitudinal study linked higher state and local public spending on welfare and education to substantially lower risk of dying from heart disease and from any cause (63).

The association between SES and individual health is important. The gap between the life expectancy of the top 10% of earners and that of the bottom 10% in the US has widened for decades and now differs by fourteen years for men and by thirteen years for women born in 1950. A couple of decades earlier, the longevity disparity between rich and poor men born in 1920 was six years, and for women 4.7 years (10, 64). Also in Sweden there is evidence that the SES-health gap is increasing. Life expectancy between 1990 and 2009 improved for all groups except for women with low education, and the differences in mortality according to education increased for both men and women (12).

In the 1990s the focus shifted from individual SES factors, such as household income, education and occupation as explanations for differences in individual health, to theorizing whether relative income inequality could be the reason. This suggested contextual factors behind the health effect (65).

Already in the 1970s, advocates of the psychosocial stress theory interpreted the SES gradient in terms of psychosocial ranking in the status hierarchy rather than in material terms and absolute material deprivation.

## Psychosocial stress theory

Several studies have shown that SES determines wellbeing and life expectancy. Although the causal relationship can go both ways, i.e. poor health can prevent people from advancing socioeconomically and healthier people are more likely upwardly mobile on the social ladder (66-67), the SES gradient in health remains (68). One possible pathway for the SES gradient in health is that being in a low position in relation to others generates psychosocial stress. Observational and experimental studies have shown that subordinate animals within animal populations experience higher levels of stress than higher ranked animals (69-70). Long-term stress of social subordination can mobilize the sympathetic nervous system and evoke prolonged endocrine responses (71-72) and what is initially an

adaptive fight or flight response may lead to chronic stress-activation and adverse health consequences (73). Among primates, females have been shown to be particularly sensitive to social stressors which can deleteriously affect reproductive health. Progesterone levels are lower during the luteal phase of the menstrual cycle in subordinates, indicative of absent or impaired ovulation (72). The perception of being subordinate which may lead to psychosocial stress is thought to apply also to humans (74), and psychosocial stress to affect the health of humans (75-76). A recent study claims to demonstrate that social position (wealth rank) rather than material conditions (absolute income) explains the impact of money on health (77), which would indicate that psychosocial stress rather than material factors play the dominating role behind SES differences in health.

The principal model for the psychosocial stress theory is the neuroendocrine response (78-79) in which adrenaline and cortisol are triggered in the event of a threat. The stress response is activated not only in response to actual physical or psychological alerts, but also in anticipation of them. This type of stress, often referred to as “psychosocial”, is thought to be the main source of chronic stress. Chronic stress is acknowledged to give rise to exhaustion and affect the development of disease, although it is not clear exactly through what mechanisms (69, 80).

The demand and control model by Karasek-Theorell has been proposed as one possible explanation for how SES acts on health in the context of work life (81), stating that people in top positions have higher control over their work environment than people in lower positions, which in turn makes them more resilient to psychosocial stress. On the other hand, individuals with high demand and low control experience higher psychosocial stress, higher cortisol levels and hence more morbidity and mortality. Indicators of psychosocial stress outside work include e.g. social support in the form of emotional support (“do you have anyone with whom you can share your inner feelings and thoughts?”) and instrumental support (possibility of practical help in given situations), and social participation (contact surfaces with different associations, organizations and activities in society) (82). Particularly the social participation concept in the psychosocial stress theory is theoretically and by definition connected with the predominantly contextual concept of social capital which will be presented and discussed in the following.

## The social capital theory

The effect of social determinants on health has been known since the late 1800s when Emile Durkheim's observed an increased risk of suicide among socially isolated individuals (83). Since then numerous studies have shown that social networks and social support benefit the health of individuals (19, 84-90).

In the late 1990s the notion of psychosocial stress as a determinant of health was extended from the individual to the social context by the social capital theory. The social capital theory originates from political science and sociology, and exist in several variants, although two views have become prominent. The "cohesion" perspective, derived from both political science and sociology, defines social capital as generalized trust in other people, reciprocity and social participation (91-92). The "network" perspective, derived exclusively from sociology, defines social capital as the social network and social support of the individual and the individual's closest social relations (93). Social capital has been defined as "the features of social organization, such as civic participation, norms of reciprocity and trust in others that facilitate cooperation for mutual benefit" (94). Advocates of social capital claim that high levels of social capital, measured as e.g. trust and social participation, on a societal level is beneficial to an individual's health.

Several ecological studies have suggested significant links between social capital and mortality rates (95-97), but the relationship between social capital at the ecological/ contextual level and health factors has been inconsistent, and it is mainly in the US that a connection between social capital and mortality has been demonstrated (95). Nevertheless, a recent prospective study from Brazil showed stronger association for social capital (measured as social cohesion, informal social control, neighbor's support, social action and political efficacy) and mortality on a contextual level than at the individual level (98). A recent meta-analysis of prospective cohort studies with individual level data has demonstrated moderate effects on mortality for social participation (99), while cross-sectional studies have shown a strong association between social participation and self-rated health at the individual level (100-101). Several causal pathways between social capital and health have been suggested, such as by decreasing psychosocial stress, by decreasing the risk of being assaulted, by increasing access to local services and amenities, and by affecting individual health-related behaviors (102). Cross-sectional studies have shown significant associations between social capital and health-related behaviors (101) as well as e.g. access to a regular doctor (103). This thesis mainly, but not exclusively (paper I), concerns the third pathway connected with access to health care and amenities.

It has been proposed that income inequality creates obstacles to the formation of social capital, and that this in turn has a negative impact on health. A decrease in

social capital can lead to increased isolation and vulnerability which leads to stress and depression. As a result, more individuals may turn to alcohol, narcotics and tobacco use, which not only has health consequences to the user but also leads to increased risk of death from external causes (accidents or acts of violence) for the abuser as well as for the surrounding (104).

The introduction of social capital in public health has been opposed by the so called neo-materialists who claim that the social capital theory only blames the victims for the SES differences in health by emphasizing the responsibility of individuals and social contexts for good health rather than politics and welfare policies (105-106). While social capital has been used to describe phenomena referring to social relations at the individual and contextual/societal levels hinting at a nexus between sociology, health and economics, there is still no single definition. At least four levels on which analyses of the relationship between social capital and health can be conducted have been described: the macro (countries), the meso (neighborhoods), the micro (the social network of the individual) and the individual attitudinal/psychological (trust) levels (107). The opponents also claim that the study of social capital only obscures the relationship between ideological, political, administrative and economic determinants and health, and that material conditions, access to public welfare policy and the investment in resources such as libraries, schools and hospitals are the real explanations for a possible connection between social capital on a contextual level and health (108-109). The social capital theory has also been criticized for creating an artificial dichotomy between material and psychosocial factors, which according to the neo-materialists are determined by the same socioeconomic conditions, and for reintroducing the psychosocial stress theory, which previously has proved to accumulate scientific knowledge poorly (106). Social capital is investigated as a health determinant in paper I and a covariate in papers II and IV.

## Socioeconomic and geographical inequalities in Swedish healthcare

Although Swedish healthcare in theory is egalitarian and based on equitable access to healthcare, i.e. available care given according to need and not ability to pay, socioeconomic inequity is seen also in Sweden (5, 110-112). A study comparing healthcare utilization during the last 12 months in 21 OECD countries showed that Swedish healthcare favored higher SES groups, with only US, Mexico, Finland and Portugal having a more pro-rich healthcare (110).

Studies indicate that the unemployed seek more healthcare than the employed, but also have higher unmet healthcare needs (6, 113) and that people from lower SES

groups experience more barriers in accessing primary care compared to people from higher SES groups (114-116). Low income has been identified as one of the strongest predictors of experiencing unmet healthcare needs (117-119). The pattern is universal and Sweden is not an exception (120). People of lower SES in general seek more primary care, while people of higher SES rely more upon specialist care (112; 121).

Governance of Swedish healthcare is divided into 21 county councils or regions (122). The national healthcare guarantee gives the citizens the right to primary care consultation within 7 days, and specialist consultation, treatment and elective surgery within 3 months from referral (123). However, there are no sanctions for county councils that do not deliver according to the healthcare guarantee, and some county councils (e.g. Jämtland, Härjedalen and Västerbotten, February 2018) only achieve 50% of patients referred to surgery within the healthcare guarantee, while other county councils (Halland and Gotland) in the same time period and for the corresponding treatment presented results above 90% (124). This demonstrates a geographically unequal healthcare in Sweden, where the waiting times for surgery and specialist treatment and perhaps also chance of survival depend on where you live. The results do not seem to depend on which political parties are in power in the region. Regions that offer shorter healthcare guarantee to specialist appointment (Halland 60 days and Stockholm 30 days from referral) (125-126) and present almost fulfilled healthcare guarantee results overall are governed by right-wing coalitions, while Gotland, which for the same time period demonstrates a strong prevalence of surgeries performed within the healthcare guarantee, is dominated by a socialist/left-wing majority (127). The county of Skåne, presented in this material, has a percentage of achieved healthcare guarantee near the Swedish average (90% to general practitioner, GP, 80% to a specialist and 70% to elective surgery) (124). Patients whose waiting time extends beyond the healthcare guarantee have the right to treatment in other county councils or abroad, paid by their home county council (123, 128). There are however no easily attainable data on how many patients that receive treatments in other county councils or abroad.

Currently the waiting times have exceeded the lives of some patients. Also in a county council/region with relatively good performance results such as Stockholm, cases with long waiting times leading to spread of cancer and even death, have raised concern (129). One reason for the ineffective healthcare in Sweden is a shortage of nurses due to mass staff resignation in response to unsatisfactory working conditions (130).

Healthcare in Sweden is primarily financed through general taxation to minimize financial barriers for access. An affordable co-payment (200-350 SEK/20-35 euros) is in general required for all visits until a high-cost protection sets in above 1100

SEK/110 euro (131). Still, this co-payment constitutes a barrier for low-income groups and the unemployed according to surveys (120).

One thing a citizen can do to access more immediate medical consultation is to sign up for a private health insurance, and today about 10% of Swedes aged 16-64 have a private insurance. Over 70% of the insurances are paid by the employer. It is said to be a complement to public healthcare and not to compete with it. The insurance does not give priority to the highly specialized university hospitals which are still publicly run (132). Still, private insurances can be seen as an advantage for the working population, which unintendedly induces wider health gaps among socioeconomic groups.

## Healthcare utilization and unmet healthcare needs

According to Penchansky and Thomas the concept of “access” goes beyond the use of the health system, and has five dimensions: availability, accessibility, accommodation, affordability, and acceptability (133). The accessibility of health services depends on a multitude of factors determined by the healthcare system and the patients themselves. On the supply side (healthcare system), political and organizational regimes (e.g. public or private health insurance), the volume and distribution of human resources, waiting times, referral patterns, booking systems, continuity and quality of care can affect accessibility (134-136). On the demand side, the patients’ age, SES, previous experience with and expectations on care and level of health literacy may also influence their readiness to seek (117; 120; 137-139).

A connection between social capital and healthcare utilization has been shown (140-141) and is thought to derive from the fact that more egalitarian societies have more social capital partly produced by the social infrastructure in which the healthcare system is included (44). Studies from the southernmost part of Sweden suggest that generalized trust in other people is significantly associated with access to a regular doctor (103). Healthcare utilization disparities are an issue particularly in countries with vast income inequality and private insurances but exist also in more egalitarian countries like Sweden (111).

Unmet healthcare needs have been referred to as a measure of “the differences, if any, between those services judged necessary to deal appropriately with defined health problems and those services actually being received... an unmet need is the absence of any, or of sufficient, or of appropriate care and services”. There are two possible approaches to measure unmet healthcare needs in a population: “clinical” or “subjective”. The former relies on a clinical assessment of whether an individual

did not receive appropriate care, where the definition of appropriate is based on clinical guidelines and hence specific to a narrow set of conditions and treatments. The latter relies on individuals' subjective assessments that they have not received the care that they need (142). The latter approach is more feasible as numerous existing surveys include questions pertaining to unmet need. It is also in some ways superior since arguably individuals are better able to estimate their health status (143), as well as being in a unique position to identify shortcomings in their experiences with healthcare. Self-assessed unmet need (SUN) during the last 12 months has been assessed in European surveys, e.g. SHARE (Survey of Health, Ageing and Retirement in Europe) and SILC (Statistics on Income and Living Conditions) which provides comparative cross-country data for SUN. Sweden demonstrated higher SUN in these studies than the European average, although most of it was not health system related and economic reasons were low (117). However, the results of SUN items depend upon how SUN is defined, upon the framing of the questions, and upon the possible reasons for unmet healthcare needs that are included.

The literature is scarce regarding prospective studies on the association between unmet healthcare needs at baseline and mortality at follow up. During the background work for paper IV only one such study was found, on elderly in Spain, although with a different measure for need than the one used in this thesis. In the study a need for healthcare was determined to be present if the person reported "fair", "poor" or "very poor" self-rated health, if the person had two or more chronic conditions or was dependent in at least one basic activity or daily living. Need was considered unmet if the person had no visits to or from a physician during the last 12 months. After a median of 60.3 months those with unmet healthcare needs demonstrated significantly higher mortality, after adjustment for several confounding factors (144).

## Primary care in Sweden after the reform

Strong primary care (PC) is associated with better population health (145-147), improved quality of care (148), reduced socioeconomic inequality in health (145), higher self-rated health for people with chronic diseases (149) and better cost control (150).

Swedish primary care does not technically have a gatekeeping system to secondary care, which most other European countries have, but there is an effort to steer patients away from secondary care through a somewhat lower co-payment for



primary care than secondary care (122, 151). Swedes make fewer outpatient visits compared to other high-income countries. The average number of doctor consultations (to GPs as well as specialists) is about three per person and year while the average is six for OECD countries (152). It is speculated that this is due to the healthcare organization in Sweden, where nurses manage a greater number of visits, and that it is dominated by hospital-based care (5).

In 2007, the first county councils took the initiative to facilitate privatization of PC in an attempt to make PC more accessible and responsive to patients' expectations (153). In 2010, the national Health Care Act made free choice of provider and freedom of establishment for PC providers mandatory for county councils, which have the political and economic responsibility over healthcare in Sweden (154). An increased number of PC providers would stimulate competition in order to gain and maintain patients, and the free choice and easiness to relist a threat of exit which would improve quality (155). However, data suggests that the reform has benefitted particularly the high-income groups (111), and has had a negative impact on the provision of services for persons with complex needs (5).

Today over 40% of all primary healthcare providers are private (156). Private clinics are for the most part managed by corporations owned by equity firms (capital investors) and not by the GPs or specialists themselves. These companies, reimbursed with tax funds, can make large profits and it has come to the public's attention that some companies have avoided paying taxes by channeling profits to tax havens such as Jersey and Luxembourg (157). Today there is an intense debate in Sweden whether to set a limit for profit on welfare and some insist on abolishing profits on public funds altogether (158). However, the profitmaking companies are often listed on the stock exchange, which can make an abolishment or regulation of profits difficult as it would affect investors and possibly the economy of the nation. Sweden's neighbor countries, Denmark and Norway have different PC organizations where GPs are self-employed, funded by the government or municipalities (159-160). Both countries demonstrate stronger patient continuity, hence it can be speculated whether a PC organization of self-employed GPs improves conditions for maintaining a patient-doctor relation. Sweden has despite the healthcare reform in 2010 fallen from a previously higher ranking in some cross-country healthcare indices (161), and demonstrates particularly poor results in availability and patient continuity (162).

A study conducted by the organization *Vårdföretagarna* on data from the national patient survey indicates that patients registered with private PCs are more satisfied with their provider than patients registered with a public provider, e.g. 17 out of the 20 highest rated providers in southern Sweden are private (163). Furthermore, GPs' satisfaction with their work place corresponded with patients' ratings for the same PC providers, according to a study carried out by the Swedish Medical Association

(164). The study indicated a connection between the scale of the PC provider and satisfaction among both patients and doctors, where a smaller organization was associated with higher satisfaction. PC providers of smaller scale were in general privately owned. It is likely that size matters for doctor-patient continuity and availability, where a smaller PC setting is more comprehensible as it concentrates the number of contacts to fewer staff members, resulting in a better knowledge and relationship between patient and healthcare provider.

The third paper investigates whether there are any differences in unmet healthcare needs between the public and private PC providers and if unmet healthcare needs have decreased in Skåne since the reform. A significant difference between the two organizational PC types was not expected as they are similar in responsibilities and reimbursement (153).



# Aims

## **General aims**

The general aim of this thesis is to investigate the influence of socioeconomic status (SES), social capital, psychosocial, and material factors on health outcomes, unmet healthcare needs and listing with healthcare provider.

## **Specific aims**

To investigate the information content of social capital (measured as trust), absolute income (GNP/capita) and relative income (Gini index) on the health outcomes adult and infant mortality and life expectancy in an ecological study of 23 countries (11 rich and 12 poor).

To investigate if there are SES differences in unmet healthcare needs in Skåne and, if so, to examine if economic stress, generalized trust in other people and trust in the healthcare system may influence parts of the differences.

To compare unmet healthcare needs between public and private primary care (PC) providers in Skåne by adjusting for SES and self-rated health.

To investigate if unmet healthcare needs at baseline are associated with all-cause and specific (CVD, cancer and all other causes) mortality at five-year follow-up in a cohort (aged 18-80 at baseline) in Skåne.



# Methods

## Study population

### **23 countries (paper I)**

The data in paper I was collected from several sources. World Values Survey 1993 included 43 countries with the item trust. After addition of the economic determinants (GNP/capita and Gini index) and health outcomes (adult mortality, infant mortality rate and life expectancy) from World Bank Group and WHO online databases for the same or adjacent years, 23 countries remained. No obvious selection bias was introduced in the reduction from 43 to 23 countries as both rich and poor countries as well as countries from different continents remained or were lost in about the same proportion. Eleven rich countries (GNP/capita > \$12,450/year) and 12 poor countries (GNP/capita < \$6,000/year) were left for comparison. The countries are listed in Table 1.

Table 1. Prevalence of generalized trust in other people (% of population who believes most people can be trusted), absolute income level, GNP/capita (US dollars, year 1990), relative income distribution (Gini index), adult mortality rate (deaths per 1000 people aged 25-64 years), infant mortality rate (IMR) (per 1000 births) and life expectancy (LE) in the 23 countries of the study (paper I).

Country	Trust	GNP/capita	Gini index	Adult mortality	IMR	LE
China	60.00	0.340	0.41	N.A.	38.00	69.00
Romania	16.00	1,390	0.29	7.58	27.00	70.00
Poland	35.00	1,790	0.27	9.73	19.00	70.90
Lithuania	31.00	2,710	0.37	7.65	10.00	71.30
Hungary	25.00	2,720	0.23	7.93	15.00	69.00
Brazil	7.00	2,940	0.63	N.A.	50.00	66.00
Mexico	34.00	3,030	0.50	3.84	37.00	71.00
Belarus	26.00	3,110	0.22	8.54	18.00	70.80
Russia	38.00	3,220	0.50	10.38	17.00	69.00
Latvia	19.00	3,410	0.31	8.89	14.00	69.30
Estonia	28.00	3,830	0.35	8.04	12.00	69.50
Portugal	21.00	5,930	0.36	4.22	11.00	73.70
Spain	32.00	12,450	0.32	3.26	8.00	76.70
United Kingdom	44.00	16,550	0.34	3.15	8.00	75.60
Italy	34.00	18,520	0.34	3.04	8.00	77.00
Netherlands	56.00	18,780	0.29	2.88	7.10	76.90
Belgium	33.00	18,950	0.32	3.41	7.90	76.00
France	23.00	20,380	0.26	3.41	7.30	76.70
Canada	52.00	20,440	0.30	2.78	7.00	77.20
United States	52.00	22,240	0.38	4.85	9.00	75.20
Denmark	58.00	23,700	0.26	4.04	7.50	74.70
Finland	63.00	23,980	0.24	3.64	5.60	75.10
Sweden	66.00	25,110	0.25	2.72	6.00	77.50

## The public health survey in Skåne 2012 (Paper II-III)

Data for papers II and III was gathered from the public health survey conducted in the county of Skåne, the southernmost region of Sweden, from late October 2012 to March 2013. The survey was carried out by Region Skåne, in collaboration with Statistics Sweden (Statistiska Centralbyrån). People 18-80 years old who were registered as residents in Skåne at the time (a total of 944628 people) were randomly

selected. The survey has been carried out regularly between 2000 and 2012 to chart inhabitants' health and lifestyle. The random sample was stratified for sex and geographic area (municipality/city district) by Statistics Sweden in order to increase the statistical power in smaller administrative areas. Skåne county was divided into 56 geographic areas (56 x 2) and an additional 17 districts (17 x 2) within the larger cities, which resulted in a selection of 56 600 (47 400 + 9 200 people) people in 146 strata. A total of 2350 persons could not be reached due to e.g. emigration, change of address, or proved not to be a part of the study population, resulting in 54 250 people. The survey for those aged 18-64 included 145 questions, 287 questions including subqueries. For those aged 65-80, it was somewhat less: 136 questions and 252 including subqueries. The first information letter was sent out in the end of October 2012, offering the selected people to answer the questionnaire online. The first paper questionnaire was sent out mid-November 2012. Four reminders, including a final shorter questionnaire, were also sent to non-respondents. The collection of data ended on March 22, 2013. A total of 28,029 persons responded, which corresponds to a 51.7% response rate of the original random weighted sample. The selection of responders is the same in every stratum irrespective of population size, which means that less populated geographical areas will be overrepresented and vice versa. For this reason, a weighting variable is used in the statistical calculations to retrieve representative prevalence (%) for the entire Skåne county. Due to different response rates depending on socioeconomic groups and age, a weighting variable with respect to sex, age, country of birth, marital status, income and education has been added to the result of every geographical area (120). Response analyses have e.g. shown that women respond to a higher extent than men, and older to a higher extent than younger people.

### **The public health survey in Skåne 2008 (Paper IV)**

The public health survey (PHS) in Skåne 2008 was used as the baseline for paper IV, and includes people aged 18-80 living in Skåne at the time according to the public register of residents (n=899923 people). The selection of respondents was randomized and stratified for sex and geographical area in collaboration with Statistics Sweden. Skåne county was in this survey divided into 60 municipalities and municipality districts (60x2 strata) from which a total of 48 000 people was randomly selected. From 11 municipality districts (11x2 strata) another 5600 people were randomly selected, which resulted in 53 600 people in 142 strata. An identification control of the selection before the survey was sent out led to 147 people being extracted due to e.g. emigration or recent deaths. Of the mailed questionnaires 738 were returned to sender and another 573 persons were confirmed not to be part of the study population e.g. due to protected address, move from the



county or to institutional living. This reduced the number to 52142 people in the survey. The survey had 134 questions, some which had subqueries, resulting in 273 questions regarding health, medications, social relations, sexual health, occupation and life quality. The first information letter was sent out in late August 2008 and offered the respondents to reply online. The first paper questionnaire was sent out by post on September 5, and then three reminders were sent out to non-responders, the final one in mid-October the same year. The survey informed the respondents that data such as age, sex, marital status, country of birth, citizenship, income, level of education, occupation and the year of immigration was collected from registers at Statistics Sweden (same as for PHS 2012). A total of 28 198 persons (54.1 % response rate) responded to the survey. The response rates differed according to age-groups: 39.8% for people aged 18-34 years and 66.8% for people aged 65-80. Swedish-born people responded to a higher extent than people born in other countries, 56.5%, versus those born outside Europe 31.1%. Married people and those with registered partners also responded to a higher extent than others, 59.5% versus 46.6%. High-income was also reflected in a higher response-rate, 61.8%, compared to low-income, 42.9%. The response rate also differed between geographic areas, which ranged from 30.0% to 67.4%. The response difference is reduced by adding a weighting variable accounting for age, sex, country of birth, marital status, income and education. The number of people selected in each geographic strata is the same which means areas that are less populated will be overrepresented. The weighting variable adjusts for this to give a representative view of the population and not just for the respondents.

### **Ethical approval**

All studies in this thesis have been approved by the Regional Ethical Committee at Lund University, Sweden.

The approval numbers are the following:

Paper I: No ethical approval needed in accordance with telephone contact with Ethical Committee at Lund University, 2004.

Paper II-III: No 2013/897

Paper IV: No 2010/343

# Definitions

## Dependent variables/Outcomes

*Infant mortality* is the number of deaths among infants (under age 1) per 1,000 live births. The data is from the World Bank Group for the year 1990. Paper I.

*Age-specific adult mortality* is defined by death at an age 25-64 years, and is measured as the number of deaths per 1,000 in this age interval during a given year. Data is from the online WHO mortality database for registered deaths and were obtained for 1995-98 (the years in the database closest to the year for which data regarding trust was collected). Paper I.

*Life expectancy* is the number of years of life expectancy from birth. Data is from the World Bank Group for 1990. Paper I.

*Unmet healthcare needs* during the past three months were assessed by the individuals answering “Have you during the past three months regarded yourself to be in need of healthcare by a physician, but not sought such care?” with the alternatives “No” and “Yes”. Papers II-IV.

Self-reported causes of unmet healthcare needs during the past three months were assessed with the item “What was your reason for not seeking care?”. The alternatives included: “could not afford to seek healthcare”, “did not have time to seek healthcare”, “the symptoms disappeared”, “too long waiting time”, “do not think I can get help”, “did not get in contact on the telephone”, “did not get in contact with doctor”, “did not know any good doctor”, “wanted to wait for a while” and “other” (the latter with the possibility to fill in the reason). Paper II.

*Mortality* data in paper IV was retrieved from the National Board of Health and Welfare (Socialstyrelsen) for the respondents in the 2008 survey and the time period 27 August, 2008 to December 31, 2013 (5.3 years). Of the original 28,198 people baseline population, 135 could not be traced, leaving a cohort of 28,063 people. In the follow-up period 946 people had died.

*Cause of death* was assessed according to ICD10, and divided into three categories in paper IV: 1) Cardiovascular causes of death which include myocardial infarction, stroke, pulmonary emboli, arrhythmias and diseases of the heart valves (ICD I109-I729), 2) Death from cancer (C019-C979) and 3) Other causes (A047-B999, D329-

G931 and J101-Y869), which include all infections, lung diseases, neurological conditions, gastrointestinal conditions, injuries and exposures.

## **Independent variables/Determinants**

### **Social variables**

*Trust in other people/horizontal trust* was discussed in papers I, II and IV. The data was obtained from two sources and measured at both aggregated (paper I) and individual (papers II and IV) levels. For paper I trust at country level for 23 poor and rich countries was obtained from the World Values Survey carried out in 1990-1993. Trust was based on the question: “Generally speaking, would you say that most people can be trusted or that you can’t be too careful in dealing with people”, with two alternatives. The data was coordinated and distributed at the Institute for Social Research of the University of Michigan under the direction of Professor Ronald Inglehart. Measure of trust was in percentage of “most people can be trusted” for each country. In papers II and IV trust was obtained at an individual level and assessed by the item: “Generally, you can trust other people”, with four alternatives: “Do not agree at all”, “Do not agree”, “Agree”, and “Completely agree”. In paper II the four alternatives remained in the statistical analysis while it was dichotomized into low trust (the two first alternatives) and high trust (the two latter alternatives) in paper IV.

*Trust in the healthcare system* was assessed with the item “What confidence do you have in the healthcare system?” with the alternatives “Very large”, “Rather large”, “Not particularly large”, “None”, and “No opinion”. Paper II.

*Social participation* describes how active a person is in formal and informal groups in society. It was defined by how many of the following 13 activities the respondent had been active during the previous 12 months: study circle/course at workplace, other study circle/course, union meeting, meeting of other organization, theatre/cinema, arts exhibition, church, sports event, letter to the editor of a newspaper/journal, demonstration, night club/entertainment, large gathering of relatives and private party. Social participation was classified as low if the respondents had been active in three or less alternatives. Paper IV.

*Emotional support* contains the self-perceived possibility of care and the encouragement of personal value. It has four alternative answers: “Yes, I am absolutely certain to get such support”, “Yes, possibly”, “Not certain”, and “No”. Paper II.

*Instrumental support* entails the self-perceived access to information, practical services and material resources from other persons. It has the same alternative answers as emotional support. Paper II.

*Socioeconomic status* (SES) by occupation included the six employed categories: higher level, medium level and lower level non-manual employees, skilled manual workers and unskilled manual workers as well as self-employed/farmers. The six groups outside the workforce entail the unemployed, students, early retired before age 65 (for health reasons or early retirement entitlement in the employment contract), old age pensioners above age 65 years, unclassified and long-term sick leave. Paper IV. In papers II and III early retired and old-age pensioners are collapsed into one group.

### **Economic variables**

*GNP/capita* is a measure of the absolute level of material/economic development and was measured in US dollars. For this data obtained from the World Bank Group for the year 1990, the rich countries had a GNP/capita of \$12,450 or more, while the poor countries had less than \$6,000. Paper I.

*The Gini index* is a measure of income distribution in a country. The Gini indices used in paper I are adjusted for taxes and obtained from the World Bank Group for the years 1989-1994. It is a number between 0-1, where a Gini index closer to 0 represents economic equality, while a number closer to 1 represents increasing inequality. Paper I.

*Economic stress* is defined by the answer to the question: “How many times during the past year did you not have enough money to afford the food or the clothes you and your family need?” The alternatives are: “every month”, “approximately 6 months a year”, “very occasionally” and “never”. The answers were dichotomized into the first three alternatives as having economic stress and the latter as having none. Paper II.

### **Risk behaviors**

*Smoking* contained three alternatives: “non-smoker”, “intermittent/non-daily smoker” and “daily smoker”. Paper IV.

*Leisure-time physical activity* (LTPA) was assessed with four alternatives. The sedentary alternative entails less than two hours walking, cycling or similar activity per week. The three active alternatives are moderate exercise (walking, cycling or similar activity for at least 2 h/week, sweating not necessary), moderate and regular exercise (exercising at least once or twice per week for at least 30 min each time,

sweating necessary), and regular exercise (at least three times per week for at least 30 min each time, sweating necessary). The item was dichotomized into physically active leisure-time (the three latter alternatives) and physically inactive/sedentary leisure-time (the first alternative). Paper IV.

*Body mass index* (BMI) was divided into three groups: under and normal weight (BMI 13.68-24.99), overweight (BMI 25.00-29.99) and obese (BMI above 30.00). Paper IV.

### **Health- and health system-related variables**

*Self-rated health (SRH)* in the 2008 and 2012 public health surveys was assessed by the question “How do you consider your general health status?” with five alternatives “Very good”, “Good”, “Neither good nor poor”, “Poor”, and “Very poor”. Papers II-IV.

*Active listing* (PC provider) was assessed through the question “Have you chosen your primary care provider yourself?”, with the alternatives “Yes”, “No” and “Don’t know”. Paper III.

*Private and public PC provider* was attained from the Public Health questionnaire 2012 with the question “How is our primary care organized?”, with the alternatives “Public”, “Private” and “Don’t know”. Paper III.

### **Individual characteristics/confounders**

*Age groups* were categorized in the intervals 18-24, 25-34 (18-34 in paper IV), 35-44, 45-54, 55-64 and 65-80 years for prevalence, while age-adjusted analyses were adjusted with age as a continuous variable. Papers II-IV.

The analyses in paper II-IV were stratified by *sex*.

*Country of birth* was dichotomized into “born in Sweden” or “born in other country” than Sweden. In paper II prevalence for those “born in other Nordic country” and “born in other European country” was also presented. Papers II-IV.

*Marital status* had the four alternatives “married, registered partnership or cohabitating”, “unmarried”, “divorced” and “widow/widower”. Papers II-IV.

## Statistical methods

All statistical analyses were performed using the SPSS (Statistical Package for the Social Sciences) software package. In paper I release 10.0 (2000) was used, in paper II and III version 22.0, and in paper IV version 25.0.

### **Paper I**

The associations between the social capital and material determinants, and the infant and adult mortality and life expectancy outcomes were analyzed in multiple linear regression models. Such models assume a linear association between determinants and outcomes. The three health outcome variables were analyzed separately, starting with a full multiple model including all three determinants (trust, GNP/capita and Gini coefficients). Each model was evaluated using the adjusted R-square ( $R^2$ ) values regarding information content. The associations between each independent variable and the outcome variable were assessed in the multiple models by beta coefficients, standard errors (SE) for the beta coefficients, t-values (beta coefficient divided by its standard error) and p-value. Non-significant independent variables were excluded if the adjusted  $R^2$  was not reduced to any important extent following exclusion of this exposure variable. Separate models were analyzed for all 23 countries, and for the 11 rich and the 12 poor countries. Correlations between the determinants were evaluated by Pearson correlations.

### **Papers II-III**

In these cross-sectional studies, prevalence (%) of unmet healthcare needs during the past three months, age, country of birth, marital status, self-rated health and socioeconomic status was calculated. For paper II emotional support, instrumental support, economic stress during the past year, generalized trust in other people and trust in the healthcare system were also included. In paper III prevalence (%) of PC provider and active listing was presented. Odds ratios with 95% confidence intervals (OR, 95% CI) of unmet healthcare needs during the past three months were calculated in bivariate logistic regression analyses. Age-adjusted, bivariate and multiple adjusted odds ratios with 95% confidence intervals of unmet health care needs according to socioeconomic status (paper II) and PC provider (paper III) were calculated in bivariate analyses, and multiple logistic regression analyses while

adjusting for the other independent variables. The proportion (%) of respondents with unmet healthcare needs during the past three months who reported that they could not afford or did not have time were analyzed for the working population (non-manual and manual employees and self-employed), those on long-term sick leave, unemployed and students respectively (paper II). All ten reasons for unmet needs presented in the survey, and of the total group (not limited to those with unmet needs presented in paper II), are demonstrated in figure 2. All analyses were stratified by sex and calculated with a weighting variable for sex, age, country of birth, marital status, income and education to give a representative picture of the overall population. The differences between unweighted and weighted data were very small.

## **Paper IV**

Prevalence (%) was calculated for all variables and stratified by sex. A Kaplan-Meyer graph showed proportionality between unmet and absence of unmet healthcare needs with regard to mortality. Cox proportional hazard models generated hazard rate ratios (HRRs) for total mortality with 95% confidence intervals for all variables, stratified by sex, for the time period of over five years. Crude and multiple-adjusted HRRs (95% CI) were calculated for all cause and specific (CVD, cancer and all other causes) mortality for the total population (18-80) and the age intervals 18-64 and 65-80. All analyses were unweighted to give a relation based on real events between unmet healthcare needs at baseline and mortality at follow-up.

# Results

## **Paper I – Social capital, GNP per capita, relative income and health: an ecological study of 23 countries**

The information content in the model with GNP/capita and life expectancy for all countries was particularly strong (adjusted  $R^2$  0.756, all  $R^2$  values below in the thesis are adjusted  $R^2$  values), an information content not observed when rich and poor countries were evaluated separately.

A particularly strong information content in the model with Gini index and IMR for the group of 11 rich countries was found ( $R^2$  0.750). While the 12 poor countries showed a fairly weak information content in the model with Gini index and IMR ( $R^2$  0.383), the result was much stronger when the Gini index and the GNP/capita were analyzed together with IMR ( $R^2$  0.613). Gini index ( $R^2$  0.457) and GNP/capita ( $R^2$  0.407), respectively, showed a moderate information content with IMR when all countries were investigated in the multiple linear regression models. The information content was higher when these two predictors on IMR were evaluated together ( $R^2$  0.628).

In the separate groups of rich and poor countries there were no association between any of the three determinants and life expectancy or adult mortality. While the predictors showed low information content with adult mortality in the respective models for poor ( $R^2$  0.051) and rich ( $R^2$  0.090) countries, the information content was high in the linear regression model including all three predictors and adult mortality for all countries ( $R^2$  0.638). GNP/capita seemed to be the dominant factor behind this value as almost no reduction for the adjusted  $R^2$  (0.622) was seen when the two other variables were removed from the model including all 23 countries.

Social capital (trust) showed low information content in all models.

The two strongest and only statistically significant (at 5% significance level) correlations were found for trust and GNP/capita in the 11 rich countries ( $R^2$  0.673,  $p=0.023$ ) and all 23 countries ( $R^2$  0.624,  $p=0.001$ ). However, these two variables showed such different results on health outcomes in the linear regression models that it seems unlikely that they are closely related.



## **Paper II – SES, social capital and unmet healthcare needs**

The prevalence of unmet healthcare needs in the past three months were 16.8% for men and 19.2% for women. Unmet healthcare needs decreased with increasing age for women, with an OR 0.38 (95% CI 0.32-0.45) for women 65-80 years compared to women 18-24 years. Men aged 25-54 years had significantly higher odds ratios of unmet healthcare needs, OR 1.45 (1.21-1.73), than men aged 18-24 years, while men aged 65-80 years had significantly lower OR, 0.55 (0.45-0.67), than men aged 18-24.

All other SES groups with the exception of old age pensioners/early retired had significantly higher odds ratios of unmet healthcare needs compared to higher non-manual employees for both men and women. Respondents born in other countries than Sweden had higher odds ratios of unmet healthcare needs than Sweden-born for both men and women, OR 1.70 (1.53-1.90) and 1.78 (1.61-1.97) respectively. Among men and women, divorced, respondents with low emotional support, low instrumental support, high economic stress, low trust in others, low trust in the healthcare system and poor self-rated health had significantly higher odds ratios of unmet healthcare needs compared to their reference groups, respectively. In addition, unmarried women had higher odds ratios of unmet healthcare needs than married women.

The prevalence of the different reasons for unmet healthcare needs are presented in figure 2, and are presented of the total, and not only based on those with unmet healthcare needs as in paper II. The main reasons for not seeking healthcare were lack of money or time, and a disbelief that help could be received as well as wanting to wait and see. The prevalence of reporting not able to pay was 9.7% among unemployed men, 6.5% among men on long-term sick leave and sick leave pensioners, and 4.2% among male students, while working men had much lower prevalence (1.1%). Among women the prevalence of economic reasons for refraining from seeking healthcare was somewhat lower for the unemployed (4.3%) as well as individuals on sick leave and sick leave pensioners (4.3%) compared to men, while for female students (5.4%) and working women (1.7%) it was somewhat higher than for their male counterparts. For those reporting not having time the pattern was reversed: among working men it was 5.6%, among those on sick leave it was 1.6%, among the unemployed it was 1.7%, and among students it was 3.6%. Among women, 5.8% of those working, 0.8% of those on sick leave and sick leave pensioners, 1.4% of the unemployed and 5.8% of the students reported lack of time.

Odds ratios of unmet healthcare needs in multiple analyses for SES groups, with non-manual employees in higher positions as the reference, did not change considerably when controlling for age. Skilled and unskilled manual employees,

self-employed/farmers, the unemployed as well as the group on long-term sick leave retained significantly higher odds ratios of unmet healthcare needs compared to the higher non-manual employees (reference group) among men also after adjusting for country of birth, marital status, emotional support, instrumental support, economic stress, generalized trust in others and trust in the healthcare system (table 2). The odds ratios attenuated to statistically not significant results after finally adjusting for self-rated health. For women belonging to SES groups with higher unmet healthcare needs, the ORs attenuated to not significant results after adjusting for economic stress (skilled manual workers), generalized trust in others (unskilled manual workers and unemployed) and self-rated health (long-term sick leave) among women.

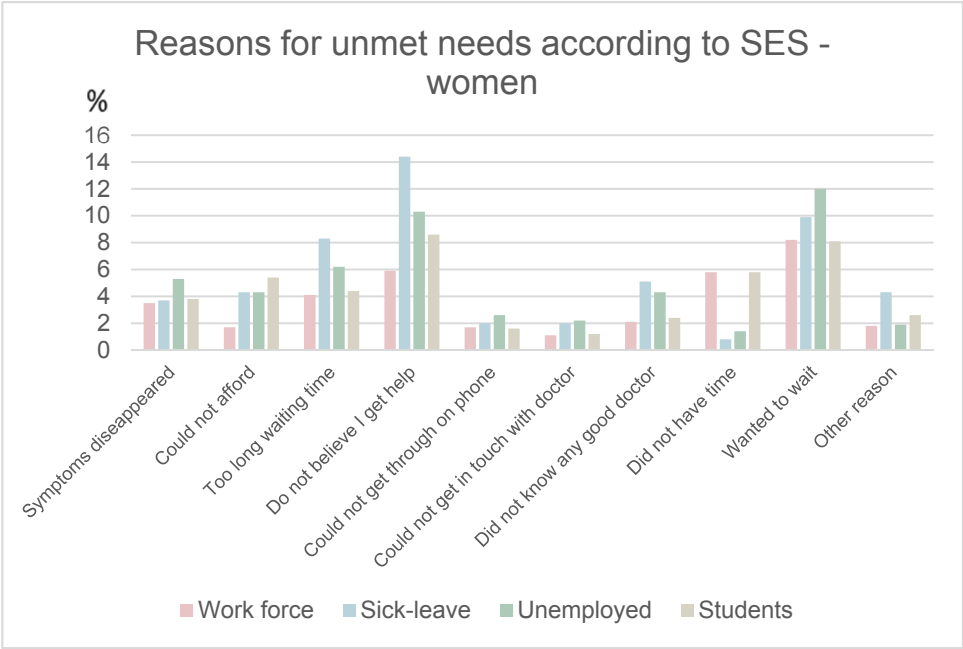
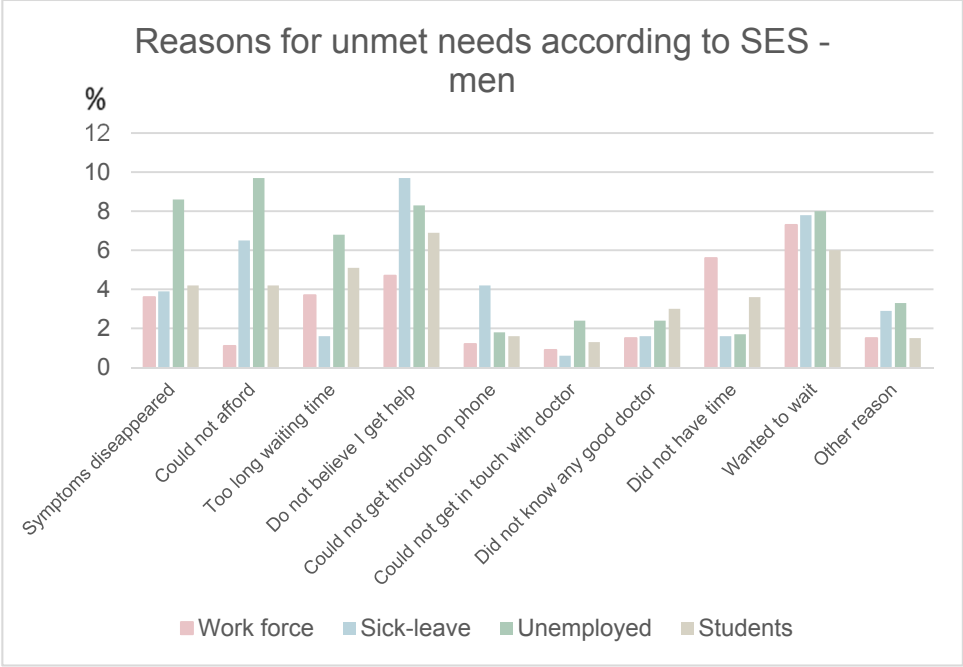


Figure 2. Prevalence (%) of reasons for unmet healthcare needs according to SES. Public Health Survey Skåne, 2012.

Table 2. Age-adjusted and multiple adjusted odds ratios (OR, 95% CI) of having unmet healthcare needs in the last 3 months according to socioeconomic status (SES). The Public Survey in Skåne 2012. Men=12,828, women= 15,201.

Men	Model 1	Model 2	Model 3	Model 4	Model 5
Higher non-man.	1.00	1.00	1.00	1.00	1.00
Medium	<b>1.26 (1.02-1.57)</b>	<b>1.27 (1.02-1.58)</b>	<b>1.24 (1.00-1.55)</b>	1.21 (0.97-1.51)	1.12 (0.89-1.41)
Lower	<b>1.32 (1.02-1.69)</b>	1.23 (0.96-1.59)	1.20 (0.92-1.54)	1.14 (0.88-1.48)	1.06 (0.81-1.38)
Skilled manual	<b>1.60 (1.32-1.95)</b>	<b>1.45 (1.19-1.77)</b>	<b>1.40 (1.14-1.70)</b>	<b>1.32 (1.08-1.61)</b>	1.15 (0.93-1.41)
Unskilled man.	<b>1.87 (1.55-2.27)</b>	<b>1.58 (1.30-1.92)</b>	<b>1.48 (1.22-1.81)</b>	<b>1.38 (1.13-1.69)</b>	1.23 (0.99-1.51)
Self-employed	<b>1.52 (1.23-1.88)</b>	<b>1.44 (1.16-1.79)</b>	<b>1.42 (1.14-1.77)</b>	<b>1.35 (1.08-1.68)</b>	1.23 (0.98-1.55)
LTSL	<b>2.44 (1.81-3.28)</b>	<b>1.96 (1.44-2.67)</b>	<b>1.82 (1.34-2.49)</b>	<b>1.69 (1.23-2.32)</b>	0.56 (0.39-0.79)
Unemployed	<b>2.67 (2.12-3.35)</b>	<b>1.84 (1.45-2.34)</b>	<b>1.69 (1.33-2.15)</b>	<b>1.56 (1.22-1.99)</b>	1.15 (0.88-1.49)
Student	<b>1.41 (1.10-1.82)</b>	1.11 (0.85-1.45)	1.07 (0.82-1.39)	1.04 (0.79-1.35)	0.83 (0.62-1.10)
Pensioners/retired	0.75 (0.60-0.94)	0.70 (0.55-0.88)	0.64 (0.50-0.81)	0.60 (0.48-0.76)	0.46 (0.36-0.59)
Unclassified	2.34 (0.81-6.78)	2.00 (0.66-6.09)	2.14 (0.70-6.56)	2.03 (0.65-6.35)	1.62 (0.50-5.24)
<b>Women</b>					
Higher non-man.	1.00	1.00	1.00	1.00	1.00
Medium	1.14 (0.94-1.39)	1.14 (0.93-1.40)	1.13 (0.92-1.38)	1.08 (0.88-1.33)	1.04 (0.85-1.29)
Lower	1.15 (0.94-1.42)	1.12 (0.90-1.39)	1.11 (0.90-1.38)	1.03 (0.83-1.28)	0.99 (0.79-1.24)
Skilled manual	<b>1.32 (1.09-1.61)</b>	<b>1.22 (1.00-1.49)</b>	1.17 (0.96-1.43)	1.04 (0.85-1.27)	0.87 (0.71-1.08)
Unskilled manual	<b>1.59 (1.31-1.93)</b>	<b>1.34 (1.09-1.63)</b>	<b>1.25 (1.03-1.53)</b>	1.12 (0.92-1.38)	0.98 (0.80-1.22)
Self-employed	1.22 (0.95-1.57)	1.15 (0.88-1.49)	1.16 (0.89-1.51)	1.08 (0.83-1.41)	1.00 (0.76-1.32)
LTSL	<b>2.54 (1.99-3.25)</b>	<b>2.10 (1.63-2.72)</b>	<b>1.90 (1.46-2.46)</b>	<b>1.58 (1.21-2.07)</b>	0.60 (0.45-0.81)
Unemployed	<b>1.91 (1.50-2.42)</b>	<b>1.39 (1.08-1.78)</b>	<b>1.30 (1.01-1.67)</b>	1.17 (0.91-1.51)	0.83 (0.64-1.09)
Student	<b>1.34 (1.08-1.67)</b>	1.02 (0.82-1.29)	0.98 (0.78-1.23)	0.89 (0.70-1.12)	0.78 (0.61-1.00)
Pensioners/retired	0.76 (0.60-0.95)	0.73 (0.58-0.92)	0.69 (0.54-0.87)	0.62 (0.49-0.80)	0.50 (0.39-0.64)
Unclassified	1.24 (0.73-2.12)	0.78 (0.44-1.37)	0.68 (0.38-1.21)	0.65 (0.37-1.15)	0.42 (0.22-0.79)

Model 1: adjusted for age

Model 2: adjusted for age, country of birth, marital status, instrumental and emotional support.

Model 3: adjusted for the above and economic stress.

Model 4: adjusted for the above and trust in others.

Model 5: adjusted for the above, trust in the healthcare system and self-rated health.

LTSL= long-term sick leave.

### Paper III – differences in unmet healthcare needs between public and private PC providers

The prevalence of being listed with a public PC provider was about twice that of being listed with a private PC (total 54.8% versus 25.9%) in the county of Skåne in 2012. Still a large proportion (total 19.3%) did not know how their PC provider was organized. Although there was a slightly lower OR of unmet healthcare needs among those listed with a private PC to begin with, the statistically significant difference disappeared when adjusting for age. For men there was no difference in unmet healthcare needs between the providers when adjusting for age, marital status, country of birth, SES and self-rated health. For women a small difference remained but was not statistically significant at the 5% significance level, OR 0.93 (0.83-1.05). Women actively listed were less likely to have unmet healthcare needs than those who were passively listed, OR was 1.40 (1.25-1.57) for those passively listed compared to actively listed. Table 3.

Table 3. Prevalence (%), and crude, age-adjusted and multiple adjusted odds ratios (OR) and 95% confidence intervals (CI) of unmet healthcare needs in relation to PC provider. The Public Health Survey in Skåne 2012. Men=12,828, women= 15,201.

Men	%	Model 0	Model 1	Model 2	Model 3
Public	16.9	1.00	1.00	1.00	1.00
Private	15.7	0.90 (0.81-1.01)	0.93 (0.83 – 1.04)	0.98 (0.87-1.10)	1.00 (0.89 – 1.13)
Unsure	18.0	1.10 (0.97-1.24)	0.99 (0.87 – 1.12)	0.89 (0.79-1.02)	0.90 (0.78 – 1.02)

Women	%	Model 0	Model 1	Model 2	Model 3
Public	18.7	1.00	1.00	1.00	1.00
Private	16.7	0.88 (0.79-0.98)	0.91 (0.81 – 1.02)	0.96 (0.85-1.07)	0.93 (0.83 – 1.05)
Unsure	23.8	1.34 (1.20-1.50)	1.24 (1.10 – 1.38)	1.16 (1.03-1.30)	1.12 (0.99 – 1.27)

Model 0. Crude.

Model 1. Adjusted for age.

Model 2. Adjusted for age, marital status, country of birth and socioeconomic status.

Model 3. Adjusted for age, marital status, country of birth, socioeconomic status and self-rated health.

## **Paper IV – unmet healthcare and mortality**

The hazard rate ratios (HRRs) of mortality increased dramatically with age and poorer self-rated health for men and women. Unmarried and divorced men had significantly higher mortality than “married/partner/cohabitation”. Foreign-born women had higher mortality than Swedish-born, while this association was not seen for men. Among the SES groups, unskilled manual working men, early retired men and women, unemployed men, female students, old-age male pensioners and men and women on long-term sick leave had higher mortality than their male and female reference groups, respectively. Every-day smokers, people with sedentary leisure-time, low social participation and low trust had higher mortality, than non-smokers, people with active LTPA, high social participation and high trust, respectively. Men and women with unmet healthcare needs had higher mortality than those without unmet healthcare needs (HRR 1.43 and 1.50 respectively).

Table 4 shows significantly increased HRRs for all deaths, cancer and all other causes of death but not for cardiovascular diseases (CVD), for those reporting unmet healthcare needs compared to those not reporting unmet healthcare needs, after adjustment for age. Particularly the older part of the population, aged 65-80, had increased HRRs, while the HRRs were not statistically significant in the age group 18-64. After adjustment for the other confounders the HRRs were attenuated to not statistically significant levels, also in the model including self-rated health.

Table 4. Crude, sex-adjusted, sex- and age-adjusted and multiple adjusted HRRs (95% CI) of mortality when having

Cause of death	Ages	Model 1	N	Model 2	N	Model 3	N
	<b>18-64</b>	1.11 (0.82-1.52)	244	1.14 (0.84-1.56)	244	1.30 (0.95-1.77)	244
<b>All deaths</b>	<b>65-80</b>	<b>1.53 (1.24-1.88)</b>	595	<b>1.55 (1.25-1.90)</b>	595	<b>1.53 (1.24-1.89)</b>	595
	<b>Total</b>	1.08 (0.91-1.29)	839	1.11 (0.93-1.32)	839	<b>1.46 (1.29-1.74)</b>	839
	<b>18-64</b>	0.77 (0.36-1.63)	52	0.80 (0.38-1.70)	52	0.95 (0.45-2.02)	52
<b>CVD</b>	<b>65-80</b>	1.33 (0.91-1.94)	198	1.36 (0.93-1.99)	198	1.36 (0.93-1.99)	198
	<b>Total</b>	0.88 (0.63-1.24)	250	0.92 (0.66-1.29)	250	1.26 (0.90-1.77)	250
	<b>18-64</b>	1.12 (0.73 -1.72)	124	1.13 (0.73-1.74)	124	1.31 (0.85-2.01)	124
<b>Cancer</b>	<b>65-80</b>	<b>1.46 (1.03-2.06)</b>	223	<b>1.47 (1.04-2.07)</b>	223	<b>1.45 (1.03-2.05)</b>	223
	<b>Total</b>	1.07 (0.81-1.40)	347	1.08 (0.82-1.41)	347	<b>1.39 (1.06-1.82)</b>	347
	<b>18-64</b>	1.41 (0.81-2.43)	68	1.47 (0.85-2.55)	68	1.58 (0.91-2.75)	68
<b>Other</b>	<b>65-80</b>	<b>1.86 (1.29-2.67)</b>	174	<b>1.87 (1.30-2.69)</b>	174	<b>1.85 (1.29-2.66)</b>	174
	<b>Total</b>	<b>1.33 (0.98-1.80)</b>	242	<b>1.36 (1.01-1.84)</b>	242	<b>1.78 (1.32-2.41)</b>	242

Model 1: crude.

Model 2: adjusted for sex.

Model 3: adjusted for sex and age.

unmet healthcare needs. Unweighted. Public Health survey Skåne 2008.

<b>Model 4</b>	<b>N</b>	<b>Model 5</b>	<b>N</b>	<b>Model 6</b>	<b>N</b>
1.29 (0.94-1.76)	244	0.98 (0.69-1.38)	212	0.82 (0.60-1.13)	237
<b>1.52 (1.23-1.88)</b>	595	1.09 (0.85-1.40)	471	1.06 (0.86-1.33)	574
<b>1.45 (1.22-1.72)</b>	839	1.08 (0.88-1.32)	683	0.98 (0.81-1.17)	811
0.96 (0.45-2.04)	52	0.57 (0.23-1.37)	44	0.60 (0.28-1.30)	52
1.33 (0.91-1.95)	198	0.92 (0.57-1.47)	154	0.99 (0.66-1.47)	192
1.24 (0.88-1.74)	250	0.85 (0.56-1.29)	198	0.88 (0.62-1.24)	244
1.29 (0.84-2.00)	124	1.12 (0.70-1.77)	115	0.86 (0.55-1.34)	121
<b>1.47 (1.04-2.08)</b>	223	1.00 (0.64-1.55)	175	1.05 (0.72-1.51)	215
<b>1.40 (1.07-1.84)</b>	347	1.07 (0.78-1.47)	290	0.97 (0.73-1.28)	336
1.55 (0.89-2.69)	68	1.09 (0.57-2.08)	53	0.96 (0.54-1.71)	64
<b>1.81 (1.26-2.61)</b>	174	1.39 (0.92-2.10)	142	1.21 (0.83-1.76)	167
<b>1.74 (1.28-2.36)</b>	242	1.34 (0.94-1.89)	195	1.11 (0.80-1.52)	231

Model 4: adjusted for sex, age and country of birth (Sweden or other).

Model 5: adjusted for sex, age, country of birth, marital status, SES, smoking, LTPA, BMI, social participation and trust.

Model 6: adjusted for sex, age, country of birth and self-rated health.





# Discussion

## Social versus economic mechanisms and health outcomes

Paper I demonstrates that at the ecological country level, material factors such as absolute income and income inequality have an important influence on health. The findings did not support the social capital theory, as social capital, measured as trust, could not be linked to any of the health outcomes: infant mortality rate, adult mortality rate and life expectancy. The significant association between income inequality, absolute income and IMR indicates that economic factors can have a strong effect on health even in the short term, as IMR is a variable that corresponds to contemporary health and healthcare conditions. Gini index appeared to be the strongest determinant for IMR in rich countries, while GNP per capita also was associated with IMR in poor countries. The finding is well established in previous literature on infant mortality and economic development (37, 165) and corresponds with later studies (166).

Gini index had a particularly strong effect on mortality in the rich countries. The reason for this could be that for poor countries, GNP/capita is still the predominantly influential predictor, and not until a certain income level does income inequality take effect as a strong health determinant. However, the strong association between Gini index and IMR for rich countries could also be an effect of economic and social marginalization, with a higher share of poverty in some segments of the population. A higher Gini index could reflect a larger proportion of poverty as well as larger socioeconomic differences, but the data does not reveal whether IMR is particularly high in these population segments.

Although social capital, measured as trust, showed no significant association with any health outcomes, other social capital indicators, such as social participation have not been investigated in this study and a relationship between social capital and health can therefore not be ruled out. For an ecological study trust was the social capital indicator available.

For all countries, life expectancy and adult mortality showed a significant association with both GNP/capita and Gini index. These health outcomes are in contrast to IMR, measures of long-time exposures. The strong connection between

GNP/capita and life expectancy and mortality is expected as less economic development often correlates with poorer living standards and health (39, 51).

A connection between income inequality and social capital has been proposed in previous literature. Kawachi et al (95) demonstrated that citizens living in US states with higher income disparities in general were more distrustful and belonged to fewer social associations. The town of Roseto experienced higher mortality rates from heart attacks as it underwent rapid economic growth, and subsequently increasing economic gaps with a breakdown of community solidarity (90). However, in our study, the Pearson correlation did not suggest an association between income inequality and social capital, as the Pearson correlation between these two variables were moderate or low for all three groups, rich, poor and all countries (-0.362, -0.028 and -0.286).

One hypothesis regarding the connection between income inequality and health suggests a psychological/psychosocial pathway. People tend to feel more reciprocity as long as there is stability and predictability in material conditions. But if these conditions change rapidly, a widening gap in affluence between those who succeed and those left behind may lead to frustration and negative health effects (42, 104). Many communities have a common opinion of what an acceptable living standard is in that community. Individuals strive to adopt a material level that is considered customary for their community (167). Another pathway between income inequality and health is that income inequality may lead to underinvestment in human capital. A study showed that US states with high income inequality (measured by the proportion of total household income received by the less well-off 50%) spent a smaller proportion of the state budget on education and had poorer educational outcomes (46). Governments that allow increased income inequality are often those that also systematically underinvest in education, welfare and healthcare (62).

The method by which the studies on the relation between income inequalities and health was conducted has been under debate (168-169). Studies have shown that the relative risk of mortality for income inequality disappeared when adjusting for individual household income (50-51). Later Kennedy et al. (97) showed that US states with the highest level of income inequality were 1.25 times more likely to report being in fair or poor health after adjusting for household income as well as a range of other individual characteristics such as smoking, overweight, education, and access to healthcare.

There has also been criticism against the wide variation of indicators to measure income inequality, and that the choice often seems arbitrary (168-169). In response to this, Kawachi and Kennedy (170) reanalyzed the US data using a comprehensive

range of indicators including the Gini index, the decile ratio (ratio of the share of the 90th percentile to that of the 10th), the shares of the bottom 50, 60, and 70 percent of households, the Robin Hood index, Theil's entropy measure, and the Atkinson index. Despite different theoretical values and methods of derivation, all measures were highly correlated with each other. The lowest correlation was between the decile ratio and the Theil index ( $r$  0.86), most other measures were correlated between 0.95 and 0.99. Each indicator was about equally strongly correlated with age-adjusted mortality rates.

## Assessing unmet healthcare needs

The item "unmet healthcare needs" is a self-reported and subjective measure of access to healthcare. However, it is the most feasible and a common measure in national and international surveys to convey unmet needs (117). In our studies unmet healthcare needs were measured during the last three months while in the literature it is more commonly assessed during a 12-month period (117). A shorter interval is assumed to give a lower prevalence of unmet healthcare needs but to be more sensitive to current changes in healthcare organization and seasonal variations (epidemics etc.).

Sweden has higher unmet healthcare needs than the average in the European cross-country survey SILC (Statistics on Income and Living Conditions). The explanations for this call for further studies. One reason is that Swedes in fact have higher than average unmet healthcare needs, due to e.g. poor healthcare availability and doctor-patient continuity as some comparative data suggests (162). Other reasons could be cultural or depend on how the question is formulated. Most of the unmet healthcare needs in Sweden were not related to the healthcare system, which could indicate a matter of when to seek healthcare and when to wait. The SILC study also shows different compositions of the question pertaining to healthcare needs depending on where the question is asked. The UK version asks whether the respondent did not receive healthcare (171), while the Swedish version asks whether the respondent decided not to seek it (172). The regional survey in Skåne showed even higher unmet healthcare needs than the national SILC-survey, 18.0% unmet needs (120) compared to 9.2% in the cross-country survey, despite a shorter time window (3 months as opposed to 12 months). However, it is difficult to make any conclusions that Skåne has higher unmet needs than the national average, as the data is collected by different studies.

## The SES gradient also evident for unmet healthcare needs

Significant SES differences in unmet healthcare needs in Skåne in 2012 were demonstrated in paper II. A social gradient in unmet healthcare needs was seen for both men and women. Among men, unskilled manual workers had almost twice as much (OR 1.89, 1.56-2.29) unmet healthcare needs as the higher non-manual employees and this association did not change significantly when controlling for age. For women there were also SES differences, although not as significant for the employed population as for men. The SES differences attenuated gradually when introducing social and economic variables (emotional and instrumental support, economic stress, generalized trust in other people, trust in the healthcare system) and self-rated health. For men, unmet healthcare needs remained significantly higher in the SES groups skilled manual employees, unskilled manual employees, self-employed, unemployed and persons on long-term sick leave until the introduction of self-rated health in the multiple models. Among women the categories unskilled manual workers and the unemployed remained significantly and positively associated with having unmet healthcare needs until generalized trust was adjusted for. Unmet healthcare needs remained significantly higher for women on long-term sick leave until self-rated health was introduced. It can be hypothesized that people belonging to these groups more often had financial difficulties because of either a low-income job or no job at all. This demonstrates that even in an egalitarian country such as Sweden there are SES differences in perceived unmet healthcare needs.

Among people outside the workforce, economic reasons were one of the predominant causes for not seeking care, whereas for the employed it was lack of time. Both reported to a high extent they did not think they could get help and wanted to wait as reasons for not seeking healthcare.

Generalized trust in others and trust in the healthcare system were both associated with self-reported healthcare satisfaction. These items may facilitate access to healthcare through social connections. Access to healthcare has been suggested to be a pathway between social capital and SES differences in health (102).

Economic stress had a positive and significant association with unmet healthcare needs in the multiple regression analyses. Despite the fact that Swedish healthcare is universal and subsidized through taxes, the unemployed and those on long-term sick leave and, to some extent, unskilled manual workers claimed that their healthcare needs were not met due to economic reasons. The co-payment for a GP consultation is today about 20 euros and all visits to healthcare after 110 euros is

free for the patient. Over the last decade private health insurances have become more common in Sweden, particularly for employees in the private sector, who often receive it as a benefit through their employment. This may also add to the SES differences in accessing healthcare, as the benefit of the private health insurance is to avoid the regular waiting times to public healthcare by accessing immediate private healthcare.

## Public versus private primary care provider

No significant differences in unmet healthcare needs were seen between public and private providers when adjusting for age, marital status, country of birth and SES, in paper III. However, the number of people reporting not knowing if their PC provider belonged to a public or private organization was fairly high (19.3%). SES distribution differed between the two PC provider types, where non-manual workers to a higher extent were registered with private PC providers while the prevalence of unemployed and manual workers were higher for public providers. This is in line with previous studies showing socio-demographic differences among the providers (5, 111). It could explain the somewhat higher satisfaction among those registered with a private provider before adjusting for socioeconomic factors, as more of them belonged to the non-manual groups but also the old-age pensioners and early retired, who had the lowest unmet healthcare needs of all SES groups (9.5% for men and 10.6% for women).

Unmet healthcare needs 2012 have overall decreased slightly compared to the 2008 survey for both men and women, when unmet healthcare needs were 17.4% (16.7%, 2012) for men and 20.4% (19.2%, 2012) for women. Whether this is due to the 2010 reform or other factors is unclear.

Swedish primary care (PC) continues to suffer a poor doctor continuity and accessibility despite the 2010 reform of free choice and free establishment of PC provider. Denmark can be seen as an interesting comparison, as Danish PC scores higher in most characteristics including accessibility and continuity (162), has a higher number of visits to a physician per person and year (152), despite a lower healthcare expenditure than Sweden (173), while Sweden has a higher physician density (174). Perhaps the answer to these contradicting results lies in their different organizational set-up, where Danish GPs are self-employed on contract for the public funder, and the majority work in small units of 1-2 GPs, while most Swedish GPs are employees of corporations or county councils, working in larger settings of 4-10 GPs. Swedish GPs also experience an increasing share of the work time confined to administration (175), however, this development is not specific for

Sweden (176). Some doctors also have additional administrative commitments, and approximately half of the GPs work part-time (177), which can explain the high doctor density, yet low patient visits per doctor per year.

## The effects of unmet healthcare needs

Individuals with unmet healthcare needs had a higher risk of mortality from all causes, cancer and other causes but not from CVD. Particularly the older population (65-80) had increased risk of mortality if underlying unmet healthcare needs were present. It may be that those with chronic or long-term conditions had increased likelihood of unmet healthcare needs due to higher healthcare utilization and increased risk of mortality due to a higher morbidity. Hence, the association between unmet healthcare needs and higher mortality is expected. This material does not reveal whether those with unmet healthcare needs died prematurely, due to e.g. long waiting times to healthcare. However, age-stratifications can further specify associations between unmet healthcare needs and mortality.

Men and women were collapsed in table 3 due to a limited number of events and in order not to lose statistical significance, but also because stratification for men and women showed similar results: for men 18-80 years the HRR was 1.10 (0.87-1.38) crude and 1.43 (1.14-1.80) age-adjusted, and for women 1.12 (0.86-1.46) crude and 1.50 (1.15-1.95) age-adjusted.

The incidence rate (deaths per 100,000) is similar to the national incidence from the National Board of Health and Welfare 2013 (178). Further dissection of “other causes” resulted in too small number for statistical significance. The group neurological disorders (N=29) had a HRR of 2.02 (0.74-5.51) with underlying unmet healthcare needs, adjusted for age and sex, while correspondingly the suicide-related causes (N=21) gave a HRR of 2.43 (0.92-6.42).

Chronic conditions are more prevalent in the older population, and a positive association between older people with unmet healthcare needs and mortality is therefore not unexpected, but this study as well as data from the 2012 public health survey in Skåne show that people aged 65-80 in fact have the lowest unmet healthcare needs of all age-groups. It could thus be assumed that unmet healthcare needs to some extent are preventable.

Studies on the relationship between unmet healthcare needs and overall mortality are scarce. More studies have instead focused on the relationship between health

expenditure and health outcomes, where a higher governmental spending on healthcare has been linked to better health outcomes, e.g. longer life expectancy (179). The exception is USA, which despite higher health expenditures than any other country (17% of GDP in 2015) only ranked 42<sup>nd</sup> in life expectancy in 2016. It is therefore notable that Sweden's health expenditure was not affected by the economic crisis in 2008 (the baseline of the longitudinal study in paper IV), while the health expenditure of some countries in the European Union were. Instead the health expenditure in Sweden has steadily increased, and even dramatically in 2010 and 2011 (180). Studies have shown that crises often lead to increased socioeconomic inequalities (181), but this has not been the case in the Nordic countries (182).

## Strengths and limitations

### **Paper I**

No significant correlation between the three independent variables was found except between GNP/capita and trust in the correlation models including all countries and the rich countries. However, the different information content these two variables contributed to the models with the health outcomes illustrates that two variables with a rather strong correlation may still give different results.

The number of countries in this study is limited to the available data. The number of countries chosen in the study is based on the 43 countries presented with the trust variable in the World Values Survey 1993. Other variables have since been added, but the Gini index could not be obtained for more than 23 countries of the original 43 for the same year. Hence, no deliberate selection bias has been introduced. The significant effect measures and high information content in the models may thus reflect important associations. The risk of selection bias is probably not greater than in other ecological analyses of social capital and health.

The 23 countries in this ecological study represent different geographic locations, cultures and political and historical settings. It is thus important to be aware that the true relationship between exposure and response may be distorted by the inability to control for residual confounding variables. However, the variables in this study are well founded in the international public health literature and the literature dealing with social capital versus neo-materialist hypothesis on health outcomes.



The “ecological fallacy”, meaning that associations seen at the level of countries may not be true on the level of individuals, has to be taken into consideration (183).

## **Paper II-IV**

The study population for papers II-IV was large, with a large number of participants. It was a random, weighted sample of the population to give a representative view of the general population. The participation rate after reminders was 51.7% in papers II-III and 54.1% in paper IV. Women, older people, people born in Sweden, married people and those with a higher income and higher level of education responded to a greater extent. The response rate in papers II-III and IV, respectively, was 55.2%/56.5% for those born in Sweden, 46.8%/48.8% for those born in other Nordic countries, 33.9%/37.2% for those born in other European countries and 25.4%/31.1% for those born outside Europe. People with a higher level of education (post gymnasium) had a 59.4%/61.3% response rate, while lower educated (pre-gymnasium) had 40.1%/45.2%. Hence, the response pattern is similar for the 2008 and the 2012 public health surveys, while the response rate had decreased somewhat over the years for all groups. The risk of selection bias was estimated to be comparatively low.

Occupation was used as an indicator of SES. The Skåne public health survey in 2008 and 2012 contained the two commonly used SES indicators, occupation and education, but not income and wealth. There are three problems with using education as a measure of SES. First, fewer people had responded the question regarding their educational level, hence there was a higher number of internally missing. Second, with time the standard or mandatory level of education has risen in Sweden, meaning that older generations in general have fewer years of schooling than the youngest generation. Education has thus varying meanings depending on the year of birth (cohort effect). Third, education does not reveal information concerning differences within the working population, and between the working population and those not working, which the variable occupation does.

The item investigating unmet healthcare needs is subjective and does not reveal the actual need for or barriers to healthcare. However previous studies suggest that subjective unmet healthcare needs are not only more feasible since numerous studies already exist pertaining to this item, but also superior as individuals are better able to estimate their health status (143). Self-rated health may be regarded as a proxy for burden of disease, and by controlling for this the need for healthcare as well as morbidity was adjusted for. Unmet healthcare needs as a measure for healthcare negligence and long waiting times can be of value in order to validate the association

between mortality risk and health system weaknesses, if this information can be extracted from the question. The way the question assessing unmet healthcare needs is composed in this survey there is, however, much room for subjectivity regarding when to seek healthcare and when to wait. Specific questions regarding respondents' satisfaction with their current healthcare provider have not been assessed. Such questions could shed a different light on the current PC organization (paper III). The time window for unmet healthcare needs in this study is relatively small, still it includes a relatively high number of people with unmet healthcare needs. Surveys render a cross-sectional view of the population, and qualities such as socioeconomic, marital and smoking status may have changed during the follow-up period, although for the majority it is assumed to be consistent.

The aims of papers II-III with cross-sectional study design concern associations and causal inference is not possible, while study IV can reveal more about causality due to the longitudinal design. A true causality cannot be determined due to the possibility of residual confounding. However, the Bradford Hill criteria regarding strength (effect size) and temporality are fulfilled. The mortality rates across age intervals in paper IV were similar to national data (178), and hence believed to be representative for the general population. A longer follow-up period or larger study population (e.g. Sweden) is needed to make conclusions about critical specialty areas in regional/Swedish healthcare (paper IV). The data suggests problems in assessing cancer treatment for the elderly, while a larger material is needed to draw conclusions concerning for instance neurological and psychiatric causes of deaths.

The questionnaire from 2012 was carried out three years after the reform was implemented in Skåne and is a cross-sectional study. It cannot be ruled out that unmet healthcare needs for the two types of PC organizations have changed in different ways thereafter (paper III).



# Conclusions and future perspectives

Social capital, here measured as trust, did not show any particular explanatory value for any of the health outcomes IMR, adult mortality or life expectancy. Absolute income (GNP/capita) showed a strong explanatory value on life expectancy and adult mortality for all countries, while Gini index showed a strong explanatory value on IMR for rich countries. The study in paper I does not support the social capital theory on an ecological/contextual level. Instead it demonstrates that economic factors still have a strong association with health.

SES was significantly associated with self-reported unmet healthcare needs, and a gradient was seen between the occupational groups for men and women, however, less significant for women. The unemployed, those on long-term sick leave and unskilled manual workers reported unmet healthcare needs to a significantly higher extent than non-manual workers in higher positions. These differences were attenuated when adjusting for economic stress, trust and self-rated health.

Although the odds ratios of unmet healthcare needs were lower among respondents listed with private primary care providers compared to public, the differences were not statistically significant after adjusting for socioeconomic factors and self-rated health.

Unmet healthcare needs in Skåne were associated with higher HRRs for cancer and all other causes of death (here defined as non-cancers and non-CVD) but not CVD in the older population, 65-80 years. This suggests that persons with chronic diseases, and hence likely subjects of recurring healthcare contacts, are at higher risk for unmet healthcare needs and mortality. The HRRs were attenuated to statistically not significant levels when adjusting for self-rated health.

## Recommendations, research gaps and future perspectives

Studies on social capital and its health effects have, despite almost two decades of research, showed varying results. Consensus on a common variable for social capital, could increase the statistical power for meta-analyses which today have to take several different measures of social capital into account. The different measures of social capital most likely have different effects on human health, as they demonstrate such diverse results. In the ecological study (paper I) trust as indicator of social capital contributed the lowest information content in the models, while both social participation, age-adjusted HRR 1.83 (1.51-2.22) for men and 1.90 (1.50-2.40) for women, and generalized trust in other people, age-adjusted HRR 1.31 (1.09-1.57) for men and 1.51 (1.21-1.88) for women, were statistically significant for total mortality in the individual level prospective cohort study (paper IV). One solution would be to reject the social capital term altogether and instead agree to test social variables such as trust and social participation by their separate definitions. Still, a more constructive observation is to regard social participation, which is common to both the theoretical “cohesion” and “network” perspectives, as a core indicator of social capital, and to measure social participation both in terms of number of different activities and social contact surfaces, and in terms of intensity. The research field of social capital is interdisciplinary, interconnecting fields such as sociology, political science and public health. Perhaps a stronger cooperation between these fields would advance research further. A better knowledge of the pathophysiological pathways could for example be of utter importance in preventing psychosocial stress in work places and other social contexts.

An analysis to compare unmet healthcare needs/patient satisfaction between the Nordic countries has been considered, but comparable data of unmet needs has been difficult to retrieve. When properly used, unmet healthcare needs can guide healthcare organizations and governments in applying new methods and reforms. However, measures of unmet healthcare needs are subjective measures that vary depending on how the question pertaining to unmet healthcare needs is composed. It is particularly important to acknowledge that the results are sensitive to language and cultural variations when carrying out cross-country surveys, and to compose the questions carefully in order to be interpreted equally. Also follow-up questions, e.g. reasons for unmet healthcare needs, should be made uniform in order to prevent methodical intergroup variance. Unmet healthcare needs as a risk measure for mortality can be of value but it is important that information regarding e.g. healthcare negligence and long waiting times can be extracted. Measures of unmet healthcare needs should be made comparable across countries.

A study on healthcare guarantee results and mortality rates for different age groups and causes of deaths in Sweden may be of value to better estimate the effects of geographical inequalities in Swedish healthcare, as well as problematic specialties.



# Populärvetenskaplig sammanfattning

Socioekonomiska skillnader i hälsa är välkända, och kan dateras tillbaka till åtminstone den industriella revolutionen. Socioekonomisk status (SES) definieras genom yrke, utbildning eller inkomst. På 1960-talet startade Whitehall-studien bland statliga tjänstemän i London som visade stegvis sämre hälsa från den högsta (bäst hälsa) till den lägsta (sämst hälsa) SES-gruppen, det vill säga en tydlig SES-gradient i hälsa. Senare studier har visat att SES-gradienten i hälsa är tydlig även i Sverige och andra utvecklade länder, ofta även efter att man korrigerat för klassiska riskfaktorer för dålig hälsa. Sedan 1970-talet har det pågått en debatt om orsakerna. Två tänkbara hypoteser som framhållits är dels psykosociala och dels materiella orsaker. Teorin om socialt kapital som infördes i folkhälsovetenskapen i slutet av 1990-talet har ibland betraktats som en utvidgning av den psykosociala stressteorin. Teorin om socialt kapital framhåller liksom den psykosociala stressteorin att stress har en negativ effekt på hälsan, men att människor med hög tillit till andra, högt socialt deltagande eller starkt socialt stöd inte bara har ett bättre skydd mot stress, utan även att geografiska områden och sociala sammanhang med högt socialt kapital upplever mindre våld, bättre infrastruktur och bättre tillgänglighet till sjukvård. Andra forskare hävdar fortfarande att det egentligen är materiella förhållanden och ekonomisk ojämlikhet i vissa områden eller länder som kan förklara SES-gradienten. En tänkbar orsak till skillnader i hälsa mellan olika SES-grupper är tillgång till sjukvård, vilket undersöks i denna avhandling genom att också analysera socialt kapital (tillit och socialt deltagande) och ekonomiska faktorer.

I artikel I undersöks om socialt kapital (mätt som tillit till andra), relativ inkomst/ekonomisk ojämlikhet (mätt som Gini index) och inkomst per capita (mätt som BNP/capita) påverkar hälsa, här undersökt som vuxen- och spädbarnsdödlighet samt medellivslängd. Gini och BNP/capita har tagits ur Worldbanks och WHOs databaser medan tillit erhållits från World Values Survey (WVS), vilken vid tiden för studien innehöll data från 43 länder. Länder föll bort på grund av att tillgängliga data för Gini index inte kunde erhållas för samtliga länder. Någon tydlig selektion av länder föreligger troligen inte. Totalt kvarstod 23 länder, 11 höginkomst- och 12 låginkomstländer för analysen. Undersökningen visade att socialt kapital inte tydligt förklarade hälsoskillnader mellan länderna i någon av modellerna, medan Gini index hade ett stort förklaringsvärde i de rika länderna för spädbarnsdödlighet och BNP/capita hade ett stort förklaringsvärde för samtliga länder gällande



medellivslängd. Denna studie av länder (ekologisk studie) stödjer därmed teorin om att materiella faktorer påverkar hälsa medan den inte stödjer teorin om socialt kapital.

Artikel II undersöker om det finns socioekonomiska skillnader i tillgång till sjukvård och otillfredsställda vårdbehov i Skåne. Folkhälsorapporter har utförts av Region Skåne sedan år 2000 och underlaget till denna studie är enkäten från år 2012. Totalt besvarade 28,029 personer enkäten vilket ger en svarsfrekvens på 51.7%. Personerna som besvarat enkäten har svarat på frågan: ”Har du under de senaste tre månaderna ansett dig behöva läkarvård men ej sökt?” med svarsalternativen ”ja” eller ”nej”. Totalt svarade 16.8% av männen och 19.2% av kvinnorna ja på frågan, det vill säga att de hade otillfredsställda vårdbehov. Det fanns tydliga SES-skillnader i analyserna. Endast pensionärer hade lägre otillfredsställda vårdbehov än de högre tjänstemännen. SES-gradienten var tydligare bland männen än bland kvinnorna. Högst oddskvoter för otillfredsställda vårdbehov hade de arbetslösa och de långtidssjukskrivna, men även de flesta yrkesaktiva SES-grupper hade signifikant ökade oddskvoter för otillfredsställda vårdbehov jämfört med högre tjänstemän. Efter att ha korrigerat för ålder, födelseland, civilstånd, instrumentellt och emotionellt stöd, ekonomisk stress, generaliserad tillit till andra och tillit till sjukvård kvarstod fortfarande signifikant högre otillfredsställda vårdbehov för facklärd arbetare, icke-facklärd arbetare, egenföretagare, långtidssjukskrivna och arbetslösa hos män, medan de flesta skillnaderna hade försvunnit för kvinnor för vilka endast långtidssjukskrivna hade högre oddskvoter för otillfredsställda vårdbehov än högre tjänstemän efter motsvarande justeringar. Således finns det en SES-gradient i otillfredsställda vårdbehov i Skåne och skillnaden är tydligare hos män.

Artikel III undersöker om det finns skillnader i otillfredsställda vårdbehov mellan offentliga och privata vårdcentraler i Skåne. Sedan 2007 har antalet privata vårdcentraler ökat kraftigt i Sverige, och beräknas nu utgöra ca 40% av det totala antalet. Nationella patientenkäten som genomförts av SKL (Sveriges kommuner och landsting) har visat att patienter listade på privata vårdcentraler är nöjdare än de som är listade på offentliga. Artikel III bygger på samma material som artikel II, där de svarande även svarat på frågan om de är listade på en offentlig eller privat vårdcentral. Av männen var 53.9% och av kvinnorna 55.6% listade på en offentlig vårdcentral, medan 26.1% av männen och 25.6% av kvinnorna var listade på en privat vårdcentral. Totalt var det 19.3% (19.9% av männen och 18.6% av kvinnorna) som inte visste om deras vårdcentral var offentlig eller privat styrd. Undersökningen visade inga signifikanta skillnader i otillfredsställda vårdbehov mellan listade på offentliga och privata vårdcentraler efter korrigerat för ålder. Studien visade således indirekt inte några skillnader i otillfredsställda vårdbehov mellan offentliga och privata vårdgivare.

Artikel IV undersöker om det finns ett samband mellan otillfredsställda vårdbehov när enkäten besvarades 2008 och mortalitet under en efterföljande femårsperiod. Underlaget till studien är folkhälsorapporten 2008, som innehåller frågan om otillfredsställda vårdbehov. Mortalitet och specifika dödsorsaksdata har hämtats från Socialstyrelsen fram till och med den 31 december 2013. En ökad mortalitet (hazard rate ratio) i alla dödsorsaker, cancer och sjukdomar som varken är cancer eller kardiovaskulära sågs vid justering för ålder och kön i överlevnadsanalyserna över fem år, men däremot inte för kardiovaskulära sjukdomar, för gruppen 65-80 år med självrapporterade otillfredsställda vårdbehov när enkäten besvarades 2008. Undersökningen talar således för att det finns en ökad risk för mortalitet vid otillfredsställda vårdbehov jämfört med befolkningen i övrigt, och att det framför allt är de äldre som har ökad risk.



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