

Social epidemiology: Shuttling between upstream and downstream: A personal and narrative review

H Bosma^{1*}

Abstract

Introduction

This paper is a personal and narrative review of social epidemiology as a field of research in its own right, studying the substantial, persistent and widening gaps in health between lower and higher socioeconomic status groups. It portrays social epidemiology as a discipline studying how upstream, environmental factors (e.g. social stratification) influence health via downstream, individual factors (e.g. smoking or personality), how downstream factors (e.g. genetic factors or personality) might be just as fundamental as upstream factors in generating later socioeconomic differences in health, and how downstream factors almost never exist in a social vacuum. This review describes five themes in social epidemiology, two main perspectives on the explanation of socioeconomic differences in health, and some confusing findings regarding (natural) interventions in the United Kingdom and the Scandinavian countries. It portrays social epidemiology as a discipline that needs to shuttle back and forth between upstream and downstream factors for a full understanding of why socioeconomic differences in health exist and to find better tools to tackle the refractory health inequalities. It is a personal review, as I not only use my own work to illustrate the line of thought, but, having worked in the field for more than two decades, also permit myself a few personal reflections and comments.

*Corresponding author
Email: hans.bosma@maastrichtuniversity.nl

¹ Maastricht University, CAPHRI, Social Medicine, P.O. Box 616, 6200 MD Maastricht, the Netherlands

Conclusion

People in lower socioeconomic positions have higher risks of disease and premature mortality than their better-off counterparts. The problem is persistent and even worsening. Social epidemiology is portrayed as a challenging field of research where some questions have been answered, but new questions continue to be raised. To advance the field of research, social epidemiology can no longer dismiss individual (downstream) factors as potentially equally fundamental influences on people's life-courses. Simultaneously, contextualisation (e.g. of health behaviours) remains important, particularly in the current era dominated by an emphasis on individual responsibility.

Introduction

Social epidemiology

Social epidemiology studies the social determinants of disease.¹ These determinants are of an environmental nature. People with low incomes and low educational levels populate the unhealthy socioeconomic environments characterised by poor housing, neighbourhoods, and working conditions. The current zeitgeist focuses on the downstream, individual risk factors (such as smoking and overweight), and the responsibility for disease is currently mostly sought within the individual.

Social epidemiology, on the other hand, emphasises the relevance of the upstream, environmental influences, which places the responsibility for illness beyond the individual's control.

In this personal, narrative review of social epidemiology, I describe the discipline as a type of epidemiology that acknowledges the need to understand downstream factors for a

full understanding of the upstream influences on health, and vice versa.

Although I refer to the main works of other authors, the review is personal and biased in that I mostly use my own work, based in the Netherlands (using data from the Netherlands and several other Western countries), to illustrate the developments in social epidemiology and in that I permit myself a few personal reflections and comments on the research field.

I start off by identifying five themes relating to evidence about the way socioeconomic differences in health have been described. Subsequently, I address the main perspectives on ways to explain socioeconomic differences in health.

Finally, having shown the complex way in which upstream (i.e. environmental, contextual, and often more distal) factors and downstream (i.e. individual and more proximal) factors interconnect in generating socioeconomic differences in health, and reflecting upon some recent confusing findings regarding (natural) interventions, I call for more fundamental research in social epidemiology.

Discussion

The author has referenced some of its own studies in this review.

These referenced studies have been conducted in accordance with the Declaration of Helsinki (1964) and the protocols of these studies have been approved by the relevant ethics committees related to the institution in which they were performed.

All human subjects, in these referenced studies, gave informed consent to participate in these studies.

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Five themes

Although the Netherlands is a relatively prosperous country, socioeconomic differences in health are not only substantial, but also manifest themselves with regard to a wide variety of diseases and causes of mortality. For example, Dutch people with a low educational level die seven years earlier than those with a high educational level.²

Strikingly, this shorter life includes fifteen more years spent with disease than that of their better educated counterparts. As we travel from the northern to the southern end of the province of Limburg (the southernmost province of the Netherlands; a journey of approximately 120 kilometres), the number of years that people can expect to live without disease decreases from 62 to 58; this is associated with the more adverse socioeconomic conditions in the southern region. Data from other countries show similar socioeconomic patterns across many diseases and causes of mortality.³

The first theme thus regards the evidence showing that socioeconomic differences in health in most countries are substantial and manifest themselves in many types of diseases. The second theme concerns the rise in socioeconomic differences in health, which is also seen in the Netherlands.

Marmot's group in London was the first to show this for the United Kingdom,⁴ after which many others reported similar findings for other countries and for the trends into more recent years. Although not all studies confirm the widening gap,⁵ most evidence supports the phenomenon of widening, rather than narrowing, socioeconomic differences in health.

The inverse care law might be relevant here. This "law" states that, rather than groups with the greatest need, i.e. the lower socioeconomic groups, it is the higher socioeconomic groups that benefit more from all

kinds of (new) health services, such as smoking prevention measures.⁶

This might be illustrated by a recent intervention study that I was involved in and that concerned an intervention to decrease depressed mood in type 2 diabetes and COPD patients.⁷

The intervention aimed to improve the patients' sense of control using self-management and empowerment as ingredients. The study revealed that only the higher educated patients had benefitted from the intervention, whereas the lower educated, who generally lack a sense of control, did not. If the fundamental inequality remains unaddressed, such interventions might perhaps first and foremost be considered an economic cost-cutting exercise, whereby individuals increasingly have to manage their own affairs, even though some of them might lack the resources to do so or might have never learned how to use them. Rather than tackling the health inequalities, such interventions may thus lead to widening socioeconomic gaps in health outcomes.

The third theme relates to the evidence for describing socioeconomic differences in health as a gradient, rather than as a poor – not poor dichotomy (to which the socioeconomic differences are sometimes reduced for ease of presentation). More detailed study shows that there is in fact a socioeconomic gradient, i.e. a roughly linear association between higher income and better health. In other words: every 100 additional euros of income on average leads to better health, even when studied within a higher (or lower) income group.

For example, within the white-collar London-based civil service, there is a clear trend of decreasing incomes being associated with increasing risks of mortality,⁸ even though there is no poverty in this group. This is not meant to deny the health adversities of poverty and deprivation, but to contend that socioeconomic

differences in health tend to present themselves rather as a gradient across the whole income spectrum.

The fourth theme concerns the evidence that socioeconomic differences in health should be considered from a life-course perspective.⁹

There is increasing evidence that adverse socioeconomic conditions in early life have long-term effects on health, regardless of the socioeconomic category in which a person ends up. Previously, we have shown that such conditions in early life, perhaps through particular parental experiences and parenting styles, might promote a kind of fatalism and beliefs of low control.¹⁰

People then develop the general belief that they cannot control their environment or the events that occur. This "socialised fatalism" could well be the fundamental reason why lower socioeconomic groups often have such poor health outcomes. For example, using the same Dutch data from the GLOBE study, the much higher prevalence of this kind of fatalism explained about half of the elevated mortality risk in the lower socioeconomic groups.¹¹ At the same time, a life-course perspective could also allow the study of status inconsistency (e.g. high education and low income) as an independent risk factor for disease.¹² This evidence particularly tells us that a full evaluation of the influence of adverse socioeconomic conditions requires such conditions to be taken into account across the whole life-course.

The fifth theme regards the areas in which people live, which often have an additional influence on health, regardless of their own individual income or educational level.¹³

We have previously found that living in a relatively poor neighbourhood increased the risk of premature mortality for both poor and rich residents.¹⁴ Socioeconomic conditions in these neighbourhoods correlated with social disintegration and a shared

culture of fatalism. Other research supports the hypothesis that even country-level characteristics might matter for individual health.

Japan and the United States of America are extremes regarding income inequalities. Wilkinson has shown that child mortality, homicides and distrust are much more common in countries with wide income gaps, such as the US, than in countries with more income equality between people.¹⁵ At a lower level of aggregation, that of the household, research is also supporting contextual effects. The partner with whom someone lives introduces his or her own socioeconomic characteristics into the relation.

We have shown that men married to lower educated women had an increased risk of heart disease compared with men married to women with a higher educational level, regardless of their own educational level.¹⁶ Simultaneously, looking at the neighbourhood findings, I wonder what the generally small intra-class correlations (indicating that health differences can predominantly be found within neighbourhoods, rather than between them) imply for the effectiveness of interventions in poor areas versus those aimed at poor individuals living in both rich and poor areas.¹⁷

Most important, however, is that a full consideration of the influence of adverse socioeconomic environments requires looking beyond the individual level and taking account of the environments in which people live.

The five themes show socioeconomic differences in health as an omnipresent and worsening phenomenon that is not only a question of being poor or not. For a full appreciation of the socioeconomic influence, one should consider its influence from birth onwards and evaluate the socioeconomic characteristics of the environments in which people live. Using the five

themes, social epidemiology has put forward socioeconomic differences between people as fundamental upstream factors, as “causes of the causes”, and the research field has primarily looked at socioeconomic position as a proxy for an environmental influence that is able to affect risks of disease and premature mortality from a more distal level.

Below I try to explain the differences, which also requires me to look at factors at the individual level, i.e. the downstream factors.

Explanations

Social epidemiology has studied socioeconomic differences in health using two conceptual models, viz. causation and direct and indirect selection. The causation perspective considers socioeconomic status as the upstream, more distal cause of disease, affecting health through various mediating characteristics that are more downstream and proximate to the individual (e.g. smoking, overweight, work and housing conditions).

Recent research has also explored the influence of particular psychosocial factors in “explaining” how social class might “get under the skin”. The second perspective on the explanation of socioeconomic differences in health is the selection perspective. In general, there is less evidence for its contribution, although the impression remains that more research is needed. The direct selection perspective assumes an influence of health on social mobility, on where a person ends up in socioeconomic terms (the reverse of the causation perspective).

The indirect selection perspective assumes an influence of health determinants on social mobility. This is mostly to do with genetic factors, personality characteristics and intellectual differences between people that both affect the socioeconomic attainment and the later health status. One such personality trait might be future orientation, which has its roots in

childhood and adolescence. More future-oriented people will probably be more willing to invest in both their career and their health, resulting in high incomes and better health.

Socioeconomic status then is no longer the most fundamental cause, as future orientation becomes more fundamental. Rather than environmental, upstream factors influencing individual, downstream characteristics, individual factors dominate the explanation of socioeconomic health differences in this selection perspective. What is common to both causation and selection is that individual, downstream factors are needed to explain why socioeconomic status is related to poor health outcomes.

My own research within the causation framework has particularly supported the hypothesis that control beliefs might be a core mechanism underlying the elevated risks of disease in lower socioeconomic groups. Low control beliefs, “socialised fatalism”, and powerlessness are partly rooted in socioeconomic circumstances and might have substantial adverse effects on health.^{10,18}

We also found that low control in the workplace increased the risk of heart disease in the London-based civil service and that this low control correlated with a general sense of low control in the lower employment grades.¹⁹ Beliefs of low control might also be relevant when people rate their own health: part of the association between self-rated poor health and premature death was explained by low control beliefs.²⁰

It is not only the work environment which is important for a person’s sense of control; circumstances during upbringing may have a long-term effect as well, by contributing to an “unhealthy” personality development.¹⁰

Low control beliefs are important in the aetiology of heart disease, even more important than the traditional coronary risk factors (such as smoking and blood pressure).²¹ In a recent article, we have

shown that control beliefs contributed most substantially to the socioeconomic differences in health-related functioning, and were also more important than whether someone possessed many basic or luxury goods.²² Control beliefs were also the most important component found when people's psychological make-up was studied regarding the degree of clustering.

The psychological profile, based on the clustering, was also strongly rooted in early life and the socioeconomic conditions at the time.²³

A recent study by our group supported the relative importance of control beliefs in people with chronic conditions. Control beliefs were more important for their quality of life than having good friends or a high income.²⁴ Finally, we also found that low control does not primarily affect poor health via inward-directed mechanisms, such as depression, or outward-directed mechanisms, such as rebelliousness or hostility.²⁵

A recurrent theme is whether examining psychosocial factors distracts attention from the fundamental causes, i.e. the material and financial differences between people and the way politics influence them. According to some colleagues in the field, researchers looking at psychosocial mechanisms suggest that poor people mostly have erroneous ideas about life (e.g. they think they have no control) and thus that cognitive behavioural therapy among lower socioeconomic status groups would solve the socioeconomic differences in health. This means that an essentially societal problem is psychologised.

Although I sympathise, I think it is also important to empirically find out how social class gets under the skin. What upstream, but also downstream mechanisms contribute? I think that social epidemiology should cross disciplinary boundaries, focussing on the match and mismatch between an

individual and his or her environment. Social epidemiology is also about the match or mismatch between life's challenges and demands on the one hand and the resources that individuals have for coping on the other (e.g. effort – reward imbalance).²⁶ It should adopt a biopsychosocial perspective: contexts and environments in which people live interact with their individual characteristics to produce differences in health or disease.

It should thus shuttle back and forth between upstream and downstream. This satisfies the scientific need for full explanations, as well as providing further insights into factors that are perhaps less difficult to modify by means of interventions.

Several studies by our group support the additional influence of both direct and indirect selection and thus individual, downstream factors.

Firstly, together with youth health care physicians, we are examining the evidence supporting the direct and indirect selection perspective when looking at school dropout and its association with poor health.²⁷ We have already found that hospital admissions had a negative influence on school dropout rates, regardless of the children's socioeconomic background.²⁸ This supports the direct selection hypothesis. Other, as yet unpublished research, supporting indirect selection, indicates the (dominant) importance of low control beliefs for both later school dropout and later reports of poor health, regardless of the socioeconomic background.

Secondly, Scottish research has shown that the IQ at 12 years of age is an important predictor of mortality and the socioeconomic differences therein.²⁹ Our research did not corroborate this finding, as we found that intelligence did not relate to later hospital admissions among young adults.³⁰ However, in another study that also included older people, the higher average intelligence scores for

people with higher occupations appeared to fully explain their better cognitive, physical, and mental functioning.³¹ This emphasises the importance of underlying differences in intellectual abilities for the presence and persistence of socioeconomic differences in health, and provides evidence supporting an indirect selection perspective on health inequalities.

Thirdly, we also studied genetic factors and their contribution to socioeconomic differences in terms of the metabolic syndrome, and the incidence of Alzheimer dementia.^{32,33} In both studies, we found a small, but consistent influence of genetic factors, interacting with the socioeconomic grouping. There was no correlation between low educational level and the APOE-e4 polymorphism (an important genetic factor for Alzheimer). Genetic factors mostly affected health in the higher socioeconomic status groups (the higher educated), not in the lower socioeconomic status groups.

Apparently, an enriched environment is needed for the expression of genetic factors. More research is needed here too,³⁴ although we should perhaps not expect too much and be particularly cautious in interpreting findings and in emphasising a personalised medicine that is too heavily dominated by a genetic focus. By tailoring research and treatment to the individual, we might run the risk of losing sight of the adverse environmental determinants that some individuals share.

In sum, we may say that downstream factors such as individual health behaviours and biological risk factors, and psychological characteristics such as low control beliefs, are important for finding out how socioeconomic status affects poor health.

Similar, but also other downstream, individual factors, such as health in early life, intelligence and genetic factors, are important for social mobility and later health. Downstream factors are thus important in both the causation and selection perspective. In

the selection perspective, they even dominate the causal pathway by being more fundamental than socioeconomic grouping.

More fundamental research!

Experiences with socioeconomic differences in health in the United Kingdom and the Scandinavian countries have raised new questions for which we need more fundamental research. Despite major interventions aimed at reducing socioeconomic inequalities in health in the United Kingdom since the late 1990s, these inequalities have only increased.³⁵

Despite long-term egalitarian traditions in Sweden and Norway, these countries have not been able to eliminate socioeconomic differences in health either.³ This underlines the refractory nature of these differences and the possibility that they are based on differences that are less modifiable than we expected. Individual differences might be as important as or even more important than social differences.

For example, it has been speculated that increased social mobility in the Scandinavian countries is leaving an increasingly “unhealthy” group of people in the lower socioeconomic groups. Downstream, individual differences, as expressed in genetic factors, health status, intellectual abilities and personality traits, have so far been insufficiently examined in relation to social mobility, later health, and the development of socioeconomic differences in health.³⁴

Furthermore, we should probably also start to consider what a more important role for (direct and indirect) selection would imply for interventions.

Simultaneously, we cannot exclude the possibility that the disappointing findings in the Scandinavian countries are the result of causation processes associated with class-related stigmatisation. It could be that the increased opportunities for social mobility in these countries also

increase the stigmatisation of the people who still end up at the bottom of the socioeconomic hierarchy. The impression could be that they are too lazy or not smart enough to use the putative opportunities. This kind of stigmatisation has hardly been examined in relation to socioeconomic differences in health.³⁶

Preliminary findings in our group support our hypothesis that how society looks at lower socioeconomic status groups influences the health of the people in these groups. Once again, it is important to think about the implications for interventions when whole societies have stigmatising thoughts about people in lower socioeconomic positions.

Recent confusing experiences with (natural) interventions addressing socioeconomic differences in health thus raise new questions for fundamental research into both causation and selection processes and for reflection on the implications of any new findings for the possibilities and impossibilities of interventions tackling socioeconomic differences in health.

I would also like to add that the field of research has been predominantly quantitative in nature. Large numbers of people have been asked to fill in questionnaires developed in the ivory towers of the university. However, have we asked the right questions on what it is like to cope with low income or poverty?

Developing new questionnaires (e.g. to measure rebelliousness)³⁷ is likely not to be enough. It is possible that qualitative research, in which matters are discussed with the people themselves, might contribute more to solving the puzzle.

Our group is therefore currently working towards qualitative studies of stigmatisation, the way we as a society look at the poor, how these people themselves experience this stigmatisation, and how all this affects their health.³⁶

Conclusion

People in lower socioeconomic positions are at higher risk of both disease and premature mortality than their better-off counterparts with better positions.

The problem is persistent and even worsening. By presenting five themes and two perspectives for the explanation of socioeconomic differences in health, I hope to have been able to portray social epidemiology as an important and challenging field of research. Some questions have been answered, but new questions continue to be raised.

In answering such questions, social epidemiology can benefit from intensified cross-fertilisation between the disciplines that are needed to further the field. In this endeavour, social epidemiology should shuttle back and forth between upstream (environmental) and downstream (individual) factors.

We cannot explain the upstream influences without looking at the downstream ones. Conversely, from a bio-psychosocial perspective, upstream factors constitute the context in which – at the downstream level – individuals are shaped and interact with each other. Hence, without the upstream influences, we cannot explain the downstream influences. Why do people smoke, why do they eat too much? Smoking, overweight and other health behaviours do not originate and exist in a social vacuum. Contextualisation remains important, particularly in the current era dominated by an emphasis on individual responsibility.

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