Chauvel, L., & Leist, A. K. (in press). Social epidemiology. In J. D. Wright (Ed.), *International Encyclopedia of the Social and Behavioral Sciences* (2nd. ed.), Section *Health* (eds. Johannes Siegrist, Claus Vögele). Elsevier. DOI: 10.1016/B978-0-08-097086-8.14039-5

Full reference at orbilu.uni.lu/handle/10993/16755

AUTHOR POSTPRINT

Social Epidemiology

Louis Chauvel
University of Luxembourg
Research Unit INSIDE, IRSEI Institute
Route de Diekirch, B.P. 2
L-7201 Walferdange
E-mail: louis.chauvel@uni.lu
Telephone: +352-46 66 44 96 18

Anja K. Leist
University of Luxembourg
Faculty of Language and Literature, Humanities, Arts and Education
Research Unit INSIDE
Route de Diekirch, B.P. 2
L-7201 Walferdange
E-mail: anja.leist@uni.lu
Telephone: +352-46 66 44 95 81

Abstract
The search of social determinants of health and disease has advanced substantially over the last decade. We present recent theoretical advancements, methodological approaches, and a selection of empirical evidence for the three main research strands: First, social inequalities can explain health differences. Here, we first focus on hierarchic social stratification with regard to socioeconomic and social class differences influencing health, then we extend the view towards non-hierarchic social stratification with regard to ethno-cultural differences, lifestyle, and cognitive and non-cognitive abilities. We shortly mention social relations and social network as determinants of health. Last, we use the concept of social times to distinguish age, period, and cohort effects in population health. After presenting evidence on contextual social determinants of health, we close with methodological challenges, social policy implications, and translation to practice.

Keywords
Social inequalities; social stratification; age-period-cohort analysis; social determinants of health; multilevel modeling; directed acyclic graphs (DAG); socioeconomic position; socioeconomic gradient; fundamental cause theory; morbidity; neighborhood; welfare regime; disease; mortality; social policy assessment

Table of Contents

1 The field of social epidemiology

Health and disease are not only influenced by biological, genetic factors, and health behaviors, but also to an important extent by social and societal characteristics (Amick 1995). The discipline systematically investigating the social determinants of health and disease is called social epidemiology. The three main fields assigned to social epidemiology are related to social inequalities, social relations and social time. In this article, the focus regarding the study of *social inequalities* will be to include both the role of hierarchy in health ('vertical inequality', section 2), and to extend beyond traditional concepts of socioeconomic position and social class and include non-hierarchic differentiations such as ethno-cultural differences or lifestyle ('horizontal inequality', section 3). After that, *social relations* determining health are presented, which can be related to the French school of social sciences developed by Emile Durkheim (1897), where the study of 'social facts' is rooted in a social theory of integration and of regulation (Berkman, Glass, Brissette et al. 2000; section 4). The study of social inequalities determined by age, another non-hierarchic attribute leading to important social inequalities across cohorts and historical periods and particularly visible in age-period-cohort analyses, will be expanded in a separate section on the role of *social times* in determining health and disease (Ryder 1965; section 5). After reviewing a selection of evidence on contextual social determinants of health (section 6), we close with perspectives on methodology, social policy implications, and translation to practice (section 7).

A core hypothesis based on extensive sets of observations is that, in virtually all non-communicable diseases, a socioeconomic gradient can be observed in that lower socioeconomic groups have higher incidence or prevalence rates of disease, develop disability with a greater chance, and die at younger ages than higher socioeconomic groups. As people are born into a certain socioeconomic status or are in lower socioeconomic groups for reasons they cannot (entirely) control, these socioeconomic gradients of health and disease are often referred to as *social* or *socioeconomic inequalities*. In a time of increasing inequalities in many countries (Piketty 2014), these issues are vital for the future of human health. Today it is almost common knowledge and a central result of this discipline that social inequality leads to bad health (Wilkinson and Pickett 2010), although it can be argued about the appropriateness of the underlying social interpretations (Goldthorpe 2010) in both academic and para-academic circles.

Considering the wealth of research in social epidemiology over the last decades, this article can only give a broad overview of some of the main lines of research. In the following, concepts and research on how health is influenced by social inequalities will be presented.

2 Social inequalities in health and disease

When referring to social inequality and impact on health, two main conceptualizations might be mentioned. The first one pertains to a neutral (smooth) vision of inequality where a *vertical* scale of resources (ultimately: income) generates different health outcomes, conceptualized as *socioeconomic position* (section 2.1). The second one, *social class*, relates to more radical class divides (section 2.2). In this section, we focus on research on social inequalities as hierarchic differentiation, and particularly consider recent theoretical and methodological advancements. Whereas this 'vertical', hierarchic aspect of social inequality is the most visible result of social epidemiology, the 'horizontal' or non-hierarchic differentiation must be underlined as a source of investigation, and will be discussed in section 3.

2.1 Socioeconomic position

For Krieger and colleagues (1997), *socioeconomic position* is defined as an "aggregate concept that includes both resource-based and prestige-based measures, as linked to both childhood and adult social class position" (p. 345). In this tradition, inequality is mainly a hierarchic series of layers pertaining to unequal size of resources able to affect health. Typical measures of socioeconomic position, based on different degrees of resource and prestige, respectively, are education, income, and occupation. The interchangeable use of these indicators in social inequalities research has often been cautioned, as Krieger (2001a) notes that "(g)iven distinctions between resource-based and prestige-based aspects of socioeconomic position and the diverse pathways by which they affect health, epidemiological studies should state clearly how measures of socioeconomic position are conceptualized" (p. 697). Geyer et al. (2006) show in mortality data of Sweden and Germany that income, occupation, and education reflect different social phenomena and their associations with health outcomes relate to different underlying causal mechanisms.

2.2 Social class

The often acclaimed book of Wilkinson and Pickett (2010) is another typical example of a hierarchic conception of social stratification that had been criticized by Goldthorpe (2010) as a stronger definition of social inequality in terms of structured social classes is needed. This tradition develops a social theory of not only based on individual access to resources in a continuous social scale but to a more holistic (if not Marxist) structuration of this access by a number of classes discontinuously positioned in society, having specific borders and closures able to explain the durability of inequality. In this sense, the term *social class* is defined by Krieger et al. (1997) as a "social category referring to social groups forged by interdependent economic and legal relationships, premised upon people's structural location within the

economy" (p. 345). This definition implies that, in fact, social classes extend the view of a health 'gradient' and are (with or without Marxist connotations) are not only socioeconomic layers but unequal and mutually hostile status groups of individuals organized on the base of groups sharing social identity (language, lifestyle, elements of recognition), temporal identity (durability of the system of positions, homogamy, social immobility), and even political identity (values and political preferences, unions membership and political action). In this sense, whereas socioeconomic position is often referred to as social 'ladder' that one can climb up (or down), social class reflects both a hierarchical concept and the creation of 'identity divides' with categorically unequal groups of people. This tradition shows larger explanatory ambitions in terms of system of inequalities of resources and of statuses, resilient to equalizing public policies (Goldthorpe 2010), but may be more effective when its aims are more modest, as shown by Elo (2009) in her survey of class health inequalities, where the advantage of the second tradition is to better underline the effects of convergence and divergence of economic, educational, cultural and social resources. Before we continue to the non-hierarchic conceptualization of social stratification, let us first review evidence on (hierarchic) socioeconomic differences in health.

2.3 Empirical evidence

The field of social epidemiology has drastically evolved after several hallmark publications documenting the existence of vast health inequalities, perhaps most prominently presented with data of the Whitehall II study of British civil servants (Marmot, Stansfeld, Patel et al. 1991). Furthermore, early methodological advances came with different indices of socioeconomic inequality (see section 7 for recent methodological advancements). The interested reader is referred to two recent reviews documenting social determinants of health and health inequalities in Europe: Mackenbach, Stirbu, Roskam et al. (2008) and Marmot, Allen, Bell et al. (2012). In the beginnings of comparative social epidemiological research, often (general) mortality was used as a health outcome. Among the prominent publications in this field is a review by for instance Subramanian and Kawachi (2004). More recent approaches have benefitted from the availability of national registries on cause-specific mortality, but also on large comparative surveys on self-rated health and medical conditions.

In the last decade, the focus of social inequalities research has shifted to non-mortality health and disease outcomes. Concerning the countless studies applying outcomes such as cardiovascular disease or stroke, we have aimed at providing the most relevant studies and further readings in the respective sections. Large population-representative surveys make it possible to use the indicator of self-rated health, e.g. in research on state level-influences on health (Subramanian, Kawachi, Kennedy 2001) or use self-reports to determine socioeconomic differences in the complex old-age syndrome of frailty.

Some recent research has used biomarkers in order to determine to which extent socioeconomic differences translate into bodily changes (see the concept of embodiment; Krieger 2001b). A few (very selective) of examples of outcomes in this field are socioeconomic differences in obesity, hypertension or grip strength.
Last, one distinct line of research also makes use of psychosocial outcomes of health, such as life satisfaction or well-being, thereby identifying a socioeconomic gradient in, for instance, depression (Lorant, Deliège, Eaton et al. 2003).

3 Non-hierarchic social determinants of health

Extending the view on social inequalities from a hierarchic perspective, population health is not just about income inequalities and social class divides, but also influenced by individual attributes, both within and across social layers. Thus, a more 'horizontal differentiation' relating to non-hierarchic attributes of the members of a society shows that other factors such as ethnicity, lifestyle, and cognitive and non-cognitive abilities produce status and health differences.

Research on non-hierarchic dimensions of social stratification and its capacity in explaining health differences has gained importance during the last decade, and non-hierarchic individual factors contributing to social inequalities have been ascribed more and more importance during the last decade. In line with the notion to distinguish between proximal and distal causes for health inequalities, one can differentiate non-hierarchic individual attributes that contribute to inequalities in status and health. One line of argumentation relates to the translation of hierarchic stratification to changes in individual attributes, e.g. the level of *stress* which in turn acts as a cause for health inequalities. A prominent advocate of this line of reasoning is Nancy Krieger (2001a). To illustrate this notion, she has coined the concept of *embodiment*, "a concept referring to how we literally incorporate, biologically, the material and social world in which we live, from conception to death" (Krieger 2001b; p. 672). Another pathway how socioeconomic status translates to individual attributes is related to the notion of control and related concepts (self-efficacy, helplessness, hardiness), and it can be postulated that feeling in control is related to less stress in the sense of Krieger or that control involves material and immaterial resources such as economic power, information, or prestige. A very recent field delving even deeper into non-hierarchic dimensions of social stratification targets possible interactions of genetic and social factors and is under increasing scrutiny in the field of fertility and reproductive health (Balbo, Billari, Mills 2013), a cross-borders domain where new perspectives for social epidemiology can be found.

Another line of argumentation is evolving from the search of mediators in the socioeconomic position-health relationship. Past research has shown that socioeconomic position is not able to fully explain the health gradient: It is easy to imagine why those at the bottom of the socioeconomic ladder may fare the worst (the classic line of argumentation being that they may have limited access to healthcare, not enough resources to afford a healthy diet, or face occupational hazards). Yet health truly follows a gradient in that, compared to those at the top of the socioeconomic ladder, being just beneath the top is in many cases already associated with worse health (Marmot et al. 1991). However, the picture gets more complicated if we extend our view beyond restricted work environments (e.g. the London civil servants' population) and compare hierarchies of members of different cultural contexts (e.g. teachers in schools versus company employees). These complexifications aside, the health gradient even within a work environment cannot be explained with the mere differential availability of socioeconomic resources. Acknowledging this fact, and incorporating non-hierarchic individual attributes into frameworks and studies of social determinants of health have shown to be able to explain larger parts of the socioeconomic health gradient. While individual non-hierarchic attributes are in many cases related to health outcomes regardless of indicators of social class, it is important to bear in mind that many of these attributes are closely associated, and in many cases interact with indicators of social class. In the following, a selection of relevant research on non-hierarchic social determinants of health is depicted.

3.1 Ethno-cultural differences

The most prominent differentiations among non-hierarchic concepts of social stratification are certainly ethnicity and race. These factors may on first glance be individual-level factors, however an overwhelming body of research concludes that it is often the socio-cultural context which defines health advantages and disadvantages of native and foreign born. Native- or foreign-born status has multifaceted health implications such as differential access to health care, differences in common health behaviors of the country of residence, and most prominently strong associations with different socioeconomic position. Ethnic and racial differences in health thus cannot be investigated without considering socio-cultural context factors contributing to these health differences. As an exhaustive presentation of relevant research is beyond the scope of this article, the interested reader is referred to a comprehensive reviews on the topic in Anderson, Bulatao, Cohen et al. (2004). Whereas the main strand of research was driven by the ethnically diverse population of the U.S., recent research also considers ethnic differences health in European countries with a large migrant population. Applying the life course framework to explain ethnic differences in older-age outcomes, important theoretical and empirical contributions have been made investigating outcomes such as stroke (Glymour, Avendaño, Haas et al. 2008).

3.2 Lifestyle

These individual attributes relate to (un)healthy *lifestyle*, as important health behaviors (e.g. smoking, physical activity, fruit and vegetable consumption) in many cases follow a socioeconomic gradient as well (Lantz, Lynch, House et al. 2001). As one prominent example for the influence of lifestyle in interaction with socioeconomic position, Krueger and Chang (2008) show that high stress levels, unhealthy behaviors (former smoking, physical inactivity) can independently explain mortality. Further, the combination of these risk factors creates a group of individuals at high risk for premature death, thereby acting as a powerful toxin that can only be identified – and targeted – by including both hierarchic and non-hierarchic dimensions of social stratification in explaining health.

3.3 Cognitive and non-cognitive abilities

The rise of searching for individual-level factors contributing to social inequalities in health has certainly been expedited by theoretical advancements in *life course epidemiology*, tracing back adult health to childhood and even pre- and perinatal influences (Ben-Shlomo and Kuh 2002). In line with this framework, empirical evidence has been gathered that socioeconomic position may vary across the life course and may have different implications for later health outcomes (). In this tradition and with the availability of large datasets spanning large parts or even the whole lifespan of respondents, compelling evidence has been gathered that *intelligence*, assessed in early childhood, contributes to a large extent to adult and old-age health. This led to the spirited debate if intelligence is even the 'fundamental cause' of health inequalities (Gottfredson and Deary 2004) and to defining the emerging sub-discipline of *cognitive epidemiology* (Deary and Batty 2007). In this tradition, economists are also more and more applying the social epidemiological perspective in explaining adult socioeconomic differences and health inequalities with the impact of childhood cognitive and non-cognitive endowments (Conti, Heckman, Urzua 2010).

4 Social relations pertaining to health differences

Considering the wealth of research on the associations between social network and health (see extra chapter in this encyclopedia *Social Integration, Social Networks and Health, Stress*), we will only give a short overview of the roots of this research and its adoption in social epidemiological research.

A framework on how contextual factors shape health has been developed by Krieger (2001b), the so-called eco-social theory. Today it is widely recognized that social networks shape health and well-being of their members. In fact, this line of reasoning goes back to Emile Durkheim. In his seminal research on suicidal behavior, Durkheim proposed a double-traits explanation based on regulation (capacity to assign

oneself attainable goals) and integration (strength of social ties). Socialist but anti-Marxist, the founding father of the French school of social sciences introduced important explanatory factors. At his time, *economic crisis* – because of its reducing the capacity to achieve goals and generating frustrations and thus anomic behavior including suicide – and the emergence of a modern society of isolated individuals lacking social commitments and integrative networks have been detected as important explanations of the expansion of suicide in the late 19th century France.

Indeed, social networks cannot be reduced to the functions they provide, e.g. social support, but they have to be viewed in the larger social and cultural context: Berkman et al. (2000) make a 'plea' for a more Durkheimian view on social networks and health, as "it is critical to maintain a view of social networks as lodged within those larger social and cultural contexts which shape the structure of networks. (…) Only then can we fully consider the multiple pathways by which social networks might so profoundly influence health outcomes" (p. 846).

5 Social times in explaining health differences

An important methodological challenge from today's point of view is the integration of *time* in general. The discipline faces complex systems of social causality: Social determinants of health evolve over long time lags that are sometimes spanning several decades between the initial causes, often situated in childhood, and their ultimate consequences in late adulthood. Furthermore, social determinants of health follow complex personal trajectories that are influenced by multidimensional social and other risk factors, possible non-linearities and reversibilities. On top of these sources of complexification, 'time' is plural: The concept of 'age' transports information about individual 'somatic' *age* that shapes health outcomes, but is also the reflection of being a member of a *birth cohort*, with all life course experiences from prenatal to childhood throughout adulthood (Ben-Shlomo and Kuh 2002). Plus, it contains information on *historical period*, thus highly diversifying the definitions of time. Moreover, 'age' and 'period' can compete with regard to the stage of country development. It is therefore highly desirable yet difficult to disentangle the effects of age, period, and cohort on health and disease. As a result, an increasing demand for longitudinal datasets, panel studies, life event analysis methodology and sophisticated structural models generates large avenues for methodological developments (Oakes and Kaufman 2006).

One of the important fields in this domain is the renewal of age-period-cohort (APC) models that intend to ways disentangle effects related to somatic age, historical period, and birth cohort. From the first 1930s discoveries to Ryder's (1965) conceptualization, and traditional modeling proposals, the field of APC has

drastically evolved. After 2005, a large renewal in the domain has been allowed by new available multilevel and general linear models (Yang and Land 2013).

This trend has recently proposed new investigations of health outcomes such as happiness, obesity, smoking habits, cognitive decay, general as well as cause-specific mortality, to name just a few. APC research aims for instance at detecting birth cohorts at risk that entered adulthood in a period of unsafe health environment, for instance an epidemic outbreak, facing stronger exposure to potentially lethal infections, whereas earlier and later (luckier) cohorts faced a better context of health socialization. This kind of research allows both assessments of public health policies and forecasting on health conditions of aging populations. Extending the view of social inequalities to a comparative perspective across historical time, it is of great interest if birth cohorts differ in given advantage or disadvantage compared to earlier or later birth cohorts, that is, if there are social inequalities between generation (Chauvel and Schröder 2014). The resulting question is the extent to which these inequalities are due to individual-level factors such as educational attainment or, conversely, contextual-level factors such as historical economic situation or welfare regime, and to determine if these disadvantages are, over the life course, permanent or transitory (Chauvel, Ponomarenko, Leist in preparation).

6 Micro- and macro-contextual views

The field of social epidemiology has benefitted from a long tradition of studies investigating contextual influences on health and disease. In the following, a selection of recent evidence on the association of neighborhood factors and health will be presented. After that, comparative evidence on the influence of country, i.e. population-level influences such as types of welfare regimes, will be outlined.

6.1 Neighborhood and area

Extending the social network view on individual health differences shortly outlined before (section 4), a growing body of research investigates health effects of environmental surroundings, area, and neighborhood, applying mostly multilevel modelling. Diez Roux and Mair (2010) offer a comprehensive review on how neighborhood can contribute to social and ethnic inequalities in health. They provide a framework that explains how residential segregation by race/ethnicity or socioeconomic position is linked to neighborhood physical environment (e.g. quality of housing) as well as social environment (e.g. safety/violence). This in turn, in interaction with individual behavioral mediators and stress, influences health outcomes (Diez Roux and Mair 2010). With regard to other health outcomes, it may be worth to mention a recent study investigating causes for neighborhood inequalities in later-life cognitive function by applying a well-designed multilevel mediation analysis (Clarke, Ailshire, House et al. 2012).

Neighborhood studies face structural and methodological challenges in the search for true *causes* of health differences related to neighborhood. Oakes (2004) cautiously notes pitfalls of common multilevel models in estimating neighborhood effects and suggests both a counterfactual causal framework and a series of advances to overcome these pitfalls, proposing randomized community trials as gold standard.

6.2 Country, nations, institutions, welfare regimes

Comparative analyses of socioeconomic gradients in mortality rates show the influence of the welfare regime on the health and health inequalities of its inhabitants (Eikemo, Huisman, Bambra et al. 2008). Country of residence does not only reflect different historical steps of socioeconomic development that still influence the present situation (*path dependency*, Pierson 2000), diverging cultural lifestyles and food habits, but indeed countries are shaped by categorically different ways of organization of institutionalized solidarity and welfare regimes (Esping-Andersen 1999). Much evidence points to the fact that institutions matter for health and successful societies (Hall and Lamont 2009). Indeed, the study of comparative decommodification of health systems, insurances, pensions, education, etc. had been able to explain how similar countries in terms of economic development have had divergent outcomes in terms of quality of life and of health performances. Health and life expectancy depend to an important extent on national social policies, such as access to and quality of healthcare or tobacco control, or simply the level of living standards of older people via public and private pensions systems.

Two recent developments target, first, the use of comparative approaches to directly estimate the differential impact of country and national indicators on health outcomes, and, second, the use of the life course framework to investigate life course influences on later health outcomes.

With regard to the first line of research, the use of large national registries makes it possible to not only consider country of current residence, but also country of origin. Extending research on the so-called U.S. Stroke Belt (a number of U.S. states with high stroke rates), Glymour, Avendano, and Berkman (2007) show that residence in one of these states in childhood predicts stroke even after moving to a 'healthier' state later in life. The importance of these life course effects matter especially for stroke and other education-dependent outcomes such as old-age cognitive function or dementia mortality, such as state-level quantity and quality of education.

Another recent comparative study used a summary health policy performance indicator for 43 countries that geographically belong to Europe to determine the extent to which survival is dependent upon national health policies. The authors conclude that health policies importantly contribute to survival by showing that, overall, Sweden, Norway and Iceland perform best, whereas Ukraine, Russian Federation and Armenia perform worst (Mackenbach and McKee 2013).

With regard to the second line of research, life course theory offers plenty of possible hypotheses to test the influence of state-level life course factors on later health outcomes. It is for instance possible that transitory economic conditions such as economic booms or recessions may have long-run effects on later health outcomes. Among the possible mechanisms for this association are diverse factors such as economically influenced changes in nutrition, stress, socioeconomic status, material resources, working conditions or other factors. Several studies have found effects of economic recessions at different points throughout the life course on later health outcomes, such as economic situation at birth on cardiovascular mortality (Van den Berg, Doblhammer-Reiter, Christensen 2011) and during working life on older-age cognitive function (Leist, Hessel, Avendano 2014).

Closely related to these studies investigating the contextual influences on health differences is the research on successes and failures of social policies in a comparative and longitudinal perspective. In the following, a selection of evidence on the links between social policies and health will be discussed. After that, the chapter will be closed with pointing to challenges in the translation of evidence into policy changes and practice.

7 Perspectives on methodology, social policy and translation to practice

Despite all research on social determinants of health, implementing adequate policies to reduce health inequalities is far more difficult than expected. Especially in the U.S., life expectancy drops and morbidity increases despite all knowledge (Berkman 2009). Not only absolute, but also relative social inequalities persist despite modern welfare regimes, and current theories can only partly describe the pattern of findings (Mackenbach 2012). Avendano and Kawachi (2014) show that determining the health of a society is a complex question, as multifaceted explanations are needed for the health disadvantages of U.S. Americans compared to people from other high-income countries. Indeed, it is imperative for social epidemiological research today to focus on *social policy assessment* in a context of global social change. Inequality of outcomes in terms of health is certainly one of the strongest challenges of globalizing societies.

Before policy implications can be derived, the search for robust causes of health differences faces a multitude of serious methodological challenges. The introduction and advancement of causal diagrams, i.e. *directed acyclic graphs*, to disentangle causation and correlation in the search for social determinants of health has been valuable to advance our understanding of the pathways through which social factors operate (Glymour 2006). Social epidemiological research should in the future consider even more than

today the role of heterogeneity of effects, i.e. effect modifiers, in determining "what works for whom and when" (Glymour, Osypuk, Rehkopf 2013).

These methodological challenges in finding social determinants of health have to be extended in order to determine causation on the macro- and micro-level. In the large domain of causality analysis, further advancements have to be developed to robustly examine macro-level causation (Babones 2008), whereas the panel-based difference-in-differences propensity score matching approach offers a relevant tool to detect micro-level causation (Gebel and Voßemer 2014). Another relevant example of methodological advancements that social epidemiology should focus on more in the future is to gain evidence if and to which extent social inequalities are caused by effects of age, period, or cohort. The investigation of social times with dynamic analyses and international comparisons are vital tools to detect social policy successes and failures. Then, social epidemiological research has the capacity to robustly detect which societies perform better or worse, how and why, and which social policy changes will work and for which segments of the population in order to improve population health.

8 Links to databases and websites

(1) http://eurohealthnet.eu/

From the webpage: EuroHealthNet is a not-for-profit organisation networking the bodies publicly responsible across the European Union for health promotion, public health and disease prevention measures, and particularly addressing health and social inequities. EuroHealthNet aims to stimulate and support actions addressing the social determinants of health and health inequalities and ultimately contribute to better health for European citizens with greater equity within and between states and regions. We operate at all levels to positively influence and apply relevant policies at EU/national/local level in the pursuit of greater health equity within and between Member States.

(2) http://www.who.int/social_determinants/en/

Key concepts: http://www.who.int/social_determinants/thecommission/finalreport/key_concepts/en/

From the webpage*:** WHO Commission on social determinants in health, led by Prof. Sir Michael Marmot**.** The Commission on Social ***Determinants of Health (CSDH) was established by WHO in March 2005 to support countries and global health partners in addressing the social factors leading to ill health and health inequities. The Commission aimed to draw the attention of governments and society to the social determinants of health and in creating better social conditions for health, particularly among the most vulnerable people. The commission delivered its report to the World Health Organisation in July 2008 and it subsequently ended its functions.

(3) http://www.ehemu.eu/

From the webpage: European Health & Life Expectancy Joint Action (JA:EHLEIS) Information System. EurOhex is a website which provides access to research on health expectancies in Europe.
It includes a database on health indicators comprising life expectancies and Healthy Life Years (HLY) for 27 European countries. From 2011 onwards projects on health expectancies are conducted in the framework of a Joint Action between the European Commission and the Member-States:

(4) http://www.who.int/healthinfo/mortality_data/en/

World mortality by cause and by gender & age since the 1950 onwards.

(5)
http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTHEALTHNUTRITIONANDPOPULATION/EXTPAH/0,,contentMDK:20219043~menuPK:460195~pagePK:148956~piPK:216618~theSitePK:400476,00.html

From the webpage: Socio-Economic Differences in Health, Nutrition, and Population within Developing Countries: This site features a set of reports presenting basic data on health, nutrition, and population (hnp) inequalities within 56 low- and middle-income countries. The data are drawn from 95 household surveys undertaken in these countries by the Demographic and Health Survey project between 1990 and 2005. 56 individual country reports each provide, for the country concerned, estimated values for up to 120 hnp status, service use, and related indicators for each economically-defined quintiles of the total population, of females and males, and of rural and urban residents. Approximately half the reports provide this information for two or more points in time. An overview report features a table for each of the 120 hnp status, service use, and related indictor covered in the individual country reports. By drawing together the data for a particular indicator in all countries into a single table, the report format is designed to facilitate cross-country comparisons and the identification of global patterns.

(6) https://www.ihis.us/ihis/

Harmonized collection of American health status surveys.

9 References

Amick BC (1995) Society and health. Oxford University Press,

Anderson NB, Bulatao RA, Cohen BE, Panel on Race E, and Health in Later Life, National Research Council (2004) Critical perspectives on racial and ethnic differences in health in late life. The National Academies Press, Washington, DC

Avendano M, Kawachi I (2014) Why do Americans have shorter life expectancy and worse health than do people in other high-income countries? Annual Review of Public Health (0), doi: 10.1146/annurev-publhealth-032013-182411

Babones SJ (2008) Income inequality and population health: correlation and causality. Social Science & Medicine 66 (7):1614-1626

Balbo N, Billari FC, Mills M (2013) Fertility in advanced societies: A review of research. European Journal of Population/Revue européenne de Démographie 29 (1):1-38

Ben-Shlomo Y, Kuh D (2002) A life course approach to chronic disease epidemiology: conceptual models, empirical challenges and interdisciplinary perspectives. International Journal of Epidemiology 31 (2):285-293

Berkman LF (2009) Social epidemiology: social determinants of health in the United States: are we losing ground? Annual Review of Public Health 30:27-41

Berkman LF, Glass T, Brissette I, Seeman TE (2000) From social integration to health: Durkheim in the new millennium. Social Science & Medicine 51 (6):843-857

Chauvel L, Ponomarenko V, Leist AK (in preparation) Differential life course patterns in suicide rates of more and less fortunate birth cohorts: Intensity and durability of cohort effects in suicide in 25 countries (1970-2009).

Chauvel L, Schröder M (2014) Generational inequalities and welfare regimes. Social Forces:sot156. doi:10.1093/sf/sot156

Clarke PJ, Ailshire JA, House JS, Morenoff JD, King K, Melendez R, Langa KM (2012) Cognitive function in the community setting: the neighbourhood as a source of 'cognitive reserve'? Journal of Epidemiology and Community Health 66 (8):730-736
Conti G, Heckman J, Urzua S (2010) The education-health gradient. The American Economic Review 100 (2):234-238
Deary IJ, Batty GD (2007) Cognitive epidemiology. Journal of Epidemiology and Community Health 61 (5):378-384
Diez Roux AV, Mair C (2010) Neighborhoods and health. Annals of the New York Academy of Sciences 1186 (1):125-145
Durkheim É (1897) Le suicide. Étude de sociologie. Félix Alcan, Paris
Eikemo TA, Huisman M, Bambra C, Kunst AE (2008) Health inequalities according to educational level in different welfare regimes: a comparison of 23 European countries. Sociology of health & illness 30 (4):565-582
Elo IT (2009) Social class differentials in health and mortality: Patterns and explanations in comparative perspective. Annual Review of Sociology 35:553-572
Esping-Andersen G (1999) Social foundations of postindustrial economies. Oxford University Press,
Gebel M, Voßemer J (2014) The impact of employment transitions on health in Germany. A difference-in-differences propensity score matching approach. Social Science & Medicine 108:128-136
Geyer S, Hemström Ö, Peter R, Vågerö D (2006) Education, income, and occupational class cannot be used interchangeably in social epidemiology. Empirical evidence against a common practice. Journal of Epidemiology and Community Health 60 (9):804-810
Glymour MM (2006) Using causal diagrams to understand common problems in social epidemiology. Methods in social epidemiology:393-428
Glymour MM, Avendano M, Berkman LF (2007) Is the 'Stroke Belt' worn from childhood? Risk of first stroke and state of residence in childhood and adulthood. Stroke 38 (9):2415-2421
Glymour MM, Avendaño M, Haas S, Berkman LF (2008) Lifecourse social conditions and racial disparities in incidence of first stroke. Annals of Epidemiology 18 (12):904-912
Glymour MM, Osypuk TL, Rehkopf DH (2013) Invited commentary: off-roading with social epidemiology—exploration, causation, translation. American Journal of Epidemiology 178 (6):858-863
Goldthorpe JH (2010) Analysing social inequality: A critique of two recent contributions from economics and epidemiology. European Sociological Review 26 (6):731-744. doi:10.1093/esr/jcp046
Gottfredson LS, Deary IJ (2004) Intelligence predicts health and longevity, but why? Current Directions in Psychological Science 13 (1):1-4
Hall PA, Lamont M (2009) Successful societies: How institutions and culture affect health. Cambridge University Press,
Krieger N (2001a) A glossary for social epidemiology. Journal of Epidemiology and Community Health 55 (10):693-700
Krieger N (2001b) Theories for social epidemiology in the 21st century: an ecosocial perspective. International Journal of Epidemiology 30 (4):668-677
Krieger N, Williams DR, Moss NE (1997) Measuring social class in U.S. public health research: Concepts, methodologies, and guidelines. Annual Review of Public Health 18 (1):341
Krueger PM, Chang VW (2008) Being poor and coping with stress: health behaviors and the risk of death. American Journal of Public Health 98 (5):889-896
Lantz PM, Lynch JW, House JS, Lepkowski JM, Mero RP, Musick MA, Williams DR (2001) Socioeconomic disparities in health change in a longitudinal study of US adults: the role of health-risk behaviors. Social Science & Medicine 53 (1):29-40
Leist AK, Hessel P, Avendano M (2014) Do economic recessions during early and mid-adulthood influence cognitive function in older age? Journal of Epidemiology and Community Health 68:151-158. doi:10.1136/jech-2013-202843

Lorant V, Deliège D, Eaton W, Robert A, Philippot P, Ansseau M (2003) Socioeconomic inequalities in depression: a meta-analysis. American Journal of Epidemiology 157 (2):98-112
Mackenbach JP (2012) The persistence of health inequalities in modern welfare states: the explanation of a paradox. Social Science & Medicine 75 (4):761-769
Mackenbach JP, McKee M (2013) A comparative analysis of health policy performance in 43 European countries. The European Journal of Public Health 23 (2):195-201
Mackenbach JP, Stirbu I, Roskam A-JR, Schaap MM, Menvielle G, Leinsalu M, Kunst AE (2008) Socioeconomic inequalities in health in 22 European countries. The New England Journal of Medicine 358 (23):2468-2481. doi:10.1056/NEJMsa0707519
Marmot M, Allen J, Bell R, Bloomer E, Goldblatt P (2012) WHO European review of social determinants of health and the health divide. The Lancet 380:1101-1129
Marmot MG, Stansfeld S, Patel C, North F, Head J, White I, Brunner E, Feeney A, Marmot M, Smith GD (1991) Health inequalities among British civil servants: the Whitehall II study. The Lancet 337 (8754):1387-1393
Oakes JM (2004) The (mis) estimation of neighborhood effects: causal inference for a practicable social epidemiology. Social Science & Medicine 58 (10):1929-1952
Oakes JM, Kaufman JS (2006) Methods in social epidemiology. John Wiley & Sons,
Pierson P (2000) Increasing returns, path dependence, and the study of politics. American Political Science Review 94 (2):251-267
Piketty T (2014) Capital in the twenty-first century. Belknap Press, Cambridge, MA
Ryder NB (1965) The cohort as a concept in the study of social change. American Sociological Review:843-861
Subramanian S, Kawachi I (2004) Income inequality and health: what have we learned so far? Epidemiologic Reviews 26 (1):78-91
Van den Berg GJ, Doblhammer-Reiter G, Christensen K (2011) Being born under adverse economic conditions leads to a higher cardiovascular mortality rate later in life: Evidence based on individuals born at different stages of the business cycle. Demography 48 (2):507-530
Wilkinson R, Pickett K (2010) The spirit level. Why equality is better for everyone. Penguin Books, London
Yang Y, Land KC (2013) Age-period-cohort analysis. New models, methods, and empirical applications. Interdisciplinary Statistics Series. CRC Press, Taylor & Francis Group, Boka Raton, FL