Zahid Ansari[1], **Norman J. Carson**[2], **Michael J. Ackland**[1], **Loretta Vaughan**[1], **Adrian Serraglio**[1]

[1] *Health Surveillance and Evaluation Section, Public Health Group (PHG), Department of Human Services (DHS), Melbourne*

[2] *National Health Priorities, Food and Health Development, PHG, DHS, Melbourne*

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A public health model of the social determinants of health

Summary

As we move forward in the new century, epidemiologists and public health practitioners are faced with the challenge of reviewing the current direction of epidemiology and its links with public health. While the history of epidemiology has been a successful and productive one, there is a danger that modern epidemiology is becoming too narrow in its scope, concerned primarily with the analysis of risk factors in individuals, while ignoring sociological and ecological perspectives of health. We argue that a theoretical framework to guide the practice of epidemiology is needed which encompasses a role for social determinants of health while simultaneously also acknowledging the importance of behaviour and biology, and the inter-connectedness of all these factors. This paper presents a public health model of social determinants of health, which provides a framework for testing the causal pathways linking social determinant variables with health care system attributes, disease inducing behaviours and health outcomes. This approach provides an improved opportunity to identify and evaluate evidence-based public health interventions, and facilitates stronger links between modern epidemiology and public health practice.

Keywords: **Public health – Model – Social determinants – Risk factors – Health care – Health outcomes.**

Epidemiology has reached an interesting phase in its historical development. Epidemiologists and public health practitioners are now faced with the challenge and opportunity of reviewing its current direction as we move forward in the new century. While the history of epidemiology has been a rich and productive one, there is a danger that modern epidemiology is becoming too narrow in its scope. It has become concerned primarily with the analysis of risk factors in individuals, too reliant on an overly narrow range of research designs and techniques, while losing sight of the sociological and ecological perspectives of health. The danger of this approach is the biomedical fallacy: the error in inferring that risk factors for disease in individuals adequately explain the causes of disease in the population, or that the health of the population can be explained fully in terms of characteristics of individuals (Susser 1998). We argue that a theoretical framework is needed which encompasses a role for social determinants of health while also acknowledging the importance of behaviour and biology, and the inter-connectedness of all these factors.

Susser & Susser (1996) argue that "chronic disease epidemiology" or "risk factor epidemiology" is based on a "black box paradigm" in which exposures are related to the health outcomes "without any necessary obligation to interpolate either intervening factors or even pathogenesis", and is committed "to analyse disease solely at the individual level" ignoring the societal context of exposure and health outcome.

There are still major socio-economic differentials in health across society (Smith & Morris 1994). Yet, socio-economic factors and population perspectives on health are continuing to be largely ignored, except when social class is adjusted as a confounder in the analyses of ill effects of disease inducing behaviours such as smoking, diet and other lifestyle factors in individuals. Strong associations have been repeatedly observed in industrialised countries between social class and cancer, but social class was mentioned only as a confounder in a comprehensive review of causes of cancer in the United States (Logan 1982). In most epidemiologic studies, race, social class, and economic status are typically treated as potential confounding factors (Pearce 1996).

Although significant methodological developments have taken place in developing criteria to identify risk factors that

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may be causal, and sophisticated mathematical models have been developed to sort out the independent effects of risk factors, the importance of social factors and cultural norms that may influence the causal pathways as they relate to the occurrence of diseases in the population are often given inadequate attention. Statistical models as currently applied on proximal risk factors (e.g., smoking) preclude the impact of societal factors (e.g., poverty) which are commonly referred to as distal risk factors. Proximal factors as demonstrated through multivariate analyses are such powerful (strongly associated) predictors of disease that distal factors do not appear significant. By controlling for the effect of distal factors, the earlier part of the causal pathway is blocked, and important interactions between causes are ignored.

The complexity of interactions between factors at different levels of analyses poses significant methodological and statistical challenges in understanding causal pathways. In addition, an emphasis in public health research on distal factors such as socio-economic determinants is likely to open up more possibilities for appropriate prevention strategies than by focussing on disease inducing behaviours where we run the risk of attempting to do "too little, too late" (McMichael 1999).

The present era of epidemiology is coming to a close. The new era predicted, will focus on a paradigm of *eco-epidemiology,* defined as the study of "causal pathways at the societal level and with pathogenesis and causality at the molecular level" (Susser & Susser 1996). This stresses the necessity to integrate series of interactive research strategies or systems, each directed towards some aspects of the complex relationship of disease to the society and the individual. To gain clarity on causes of and barriers to reducing inequalities in health, there is a need to develop a new theoretical framework or model.

This paper details the public health model of social determinants in health which epitomises the paradigm of *eco-epidemiology,* assesses the fundamental features and implications of *eco-epidemiology,* and provides a basis for integration of epidemiology into public health as advocated by Pearce (1996; Susser & Susser 1996).

Social determinants of health are usefully categorised into four major groups: social determinants, health care system attributes, disease inducing behaviours, and health outcomes (Fig. 1). This model provides epidemiologists and policy makers with an opportunity to better understand: (a) the relationship between social determinants and health through description of the *structure* of the model; and (b) nature of causal relationships between social determinants and health through *analyses* facilitated by the model.

Structure of the model

Social determinants

Social and economic factors are extremely powerful predictors of death and ill-health across a wide range of diseases and injuries (Feinstein 1993; Adler et al. 1994; Fein 1995) Differences of five to 10 years in life expectancy and death rates from two to three times higher are typical between rich and poor within countries, while the difference in life expectancy between indigenous Australians and the rest of the population is as much as 18 years (AIHW 1999).

There are three distinct components of social determinants (Fig. 2) that have been widely reported in the literature. These are socio-economic determinants (e.g., age, sex, education), psychosocial risk factors (e.g., social support, self-esteem, chronic stress, isolation) and community and societal characteristics (e.g., income inequality, social capital including civic involvement, level of trust).

Three rival theories have been developed to explain the relationship between social determinants and health: material (Stronks et al. 1998), psychosocial (Marmot & Wilkinson 1999), and neo-material (Lynch et al. 2000). These three theories place the primary explanatory emphasis on each of the components of the social determinants of health that we have identified in the model. The material theory proposes

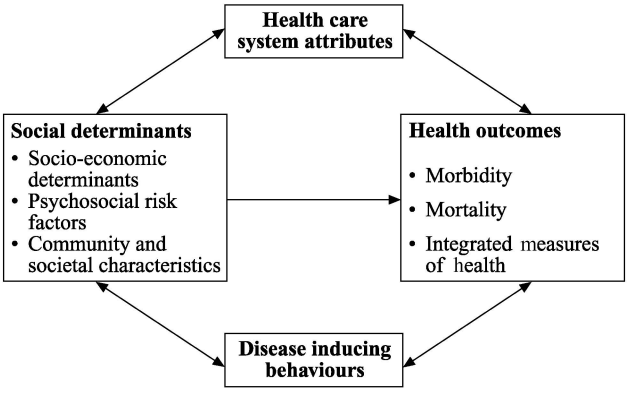

Figure 1 Public health model of the social determinants of health

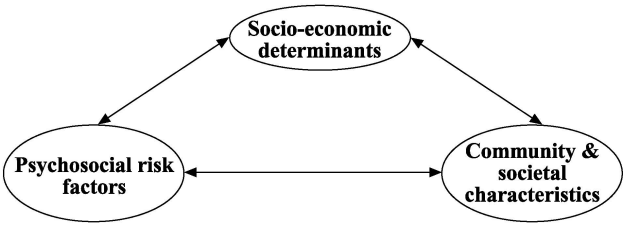

Figure 2 Inter-relationship of components of social determinants in the public health model of the social determinants of health

that it is the absolute social position of the individual which influences health status (for example, actual disposable or purchasing power which enables individuals to directly modify their immediate environment to be more health promoting) (Stronks et al. 1998). The psychosocial theory proposes that it is not the absolute social position or income which influences health, but rather the relative position/income, and the psychosocial aspects of how this relative status is perceived which mediates between endocrine and immune system pathways and long-term health impacts (Marmot & Wilkinson 1999). A contending theory, the neo-material theory, disputes the validity of both the material and psychosocial theories and instead proposes that "a combination of negative exposures and lack of resources held by individuals, along with systematic under investment across a wide range of human, cultural and political-economic processes" better explains the undisputed existence of a social gradient in health (Lynch et al. 2000). An important task in the application of our model will be to test each of these theories by carefully disentangling the complex associations between the components of social determinants (socio-economic, psychosocial and community/societal) and their associated variables.

Table 1 lists some of the variables comprising the "socio-economic status" (SES) component of social determinants. The literature supporting the existence of a strong and consistent relationship between SES and health is so vast that it is possible to refer to only a few key reviews (Feinstein 1993). Most of the variables measuring socio-economic status have been shown to have strong univariate and multivariate associations with measures of health outcome (Turrell et al. 1999).

The association between health and SES is causal and proceeds in the direction from SES to health. This is the scientific and epidemiologic basis of this model. This conclusion is derived from three pieces of evidence. Firstly, the possibility that the socio-economic gradient in health status is predominantly an artefact of reverse causality (i.e., changes in health status leading to changes in SES) has been examined in a number of cohort studies and can now be confidently rejected (Blane et al. 1993).

Secondly, it has been found that even when health behaviour is controlled for, the social gradient remains substantially intact (Marmot et al. 1991), demonstrating that a major part of the association between SES and health is due to a direct causal effect.

Thirdly, it has been found that the relationship between social hierarchy and health is not simply a matter of a contrast between those members of society falling below some "poverty level" threshold and those above, but rather that the usual pattern is a continuous gradient from poor health to good health, keeping step with the gradient in social hierarchy from bottom to top across the whole of society (Marmot et al. 1991; Diez Roux et al. 2001). The existence of such a monotonic "dose-response" relationship has been included in some published criteria for establishing causality (Hill 1965). While this criterion has been challenged as being neither necessary nor sufficient on its own for establishing causality (Rothman & Greenland 1998), nevertheless many experts contend that the existence of this pattern supports the plausibility of a causal link (Evans 1976).

Some of the variables included in "psychosocial risk factors" are listed in Table 1. There is now a general recognition that psychosocial factors such as continuing anxiety, insecurity, low self-esteem, social isolation and lack of control over work and home life, exert a powerful influence on health (WHO 1998). Stress at work was a major focus of the Whitehall II study (Marmot et al. 1997). A key finding of this study was that after controlling for the degree of control

Table 1 Social determinants in the public health model of the social determinants of health

Socio-economic determinants
- Age
- Gender
- Race
- Ethnicity
- Education
- Occupation
- (Un)employment
- Income
- Religion
- Housing - affordability, security of tenure, structure and maintenance of building, occupancy (including overcrowding)

Psychosocial risk factors
- Poor social networks
- Low self-esteem
- Self-efficacy
- Depression
- Anxiety
- Insecurity
- Loss of sense of control
- High physical/psychological demand
- Chronic stress
- Isolation
- Anger/hostility
- Coping
- Perception/expectations

Community and societal characteristics
- Social networks and support structures
- Social and community participation
- Civic and political involvement and empowerment
- Trust in people and social institutions
- Tolerance of diversity
- Altruism. Philanthropy and voluntary work
- Poverty
- Residence (urban, rural, remote)
- Income inequality
- Crime rate
- Domestic violence
- Unemployment rate

that civil servants had over work, the relationship between occupational prestige and health largely disappeared. This is consistent with other research on health and degree of control in the work environment (Karasek & Theorell 1990). Our model provides an opportunity to identify the influence of psychosocial factors and other components of social determinants on health outcomes. It also facilitates the studies of psychosocial factors as they relate to disease inducing behaviours and various attributes of the healthcare system.

Some variables included in "community and societal characteristics" are listed in Table 1. Community and societal characteristics are known to influence health (Marmot & Wilkinson 1999; Berkman & Kawachi 2000). For example, the health consequences of social support, social networks, and social isolation, as well as the links between these variables and the psychosocial variables stress, self-esteem, self-efficacy, and personal control, have been well demonstrated (Rosenfeld 1997).

Community and societal characteristics are also connected with health behaviour and even health care system attributes (Marmot & Wilkinson 1999; Berkman & Kawachi 2000). It has been argued, for example, that self-esteem and coping ability may be either reinforced or undermined by health care interventions (Lerner 1986).

Health outcomes are worse in poor areas because there are features of the community environment which predict poor health and disease such as coronary heart disease (Diez Roux et al. 2001), and behavioural problems in children, over and above individual characteristics such as income, education, and occupation (Kalff et al. 2001).

There is strong evidence coming from a number of studies conducted both between countries (Le Grand 1987), and within countries (Kaplan et al. 1996), that income inequality is an important predictor of health, independent of the absolute standard of living (Berkman & Kawachi 2000). The most egalitarian nations and regions have the highest life expectancy, not the richest (Wilkinson 1996), and this association is considerably stronger than can be accounted for by any statistical artefact (Wolfson et al. 1999).

Social capital is a relative newcomer to research on the social determinants of population health. Pioneers in the field of social capital such as Coleman, Bourdieu, Loury, and Putnam have each provided a definition with some similarities and some differences (Berkman & Kawachi 2000). One definition is that social capital represents "social relations of mutual benefit characterised by norms of trust and reciprocity" (Winter 2000), other definitions also stress themes of participation in networks, community, and personal and collective efficacy (Bullen & Onyx 2000).

Despite the difficulties of operationalising the measurement of social capital (Feldman & Assaf 1999), recent research around this issue has led to interesting results. There is evidence that social capital is associated with income inequality as well as population health (Kawachi et al. 1997).

A number of mechanisms have been proposed by which social capital might influence individual health. Suggested pathways include the diffusion of health information and the encouragement of healthy norms of behaviour; increased access to local services and agencies; and an influence on the health of individuals via psychosocial processes (Berkman & Kawachi 2000).

As various components of community and societal characteristics are measured on aggregate levels, the model provides a framework for the application of statistical methods at multiple levels of analyses (group and individual).

Healthcare system attributes

Health care has traditionally assumed a very prominent position in epidemiology and health policy, sometimes to the detriment of other perhaps more powerful social determinants of health. These social determinants have been assumed to be unpredictable, or at least uncontrollable, and hence not worth the effort to direct policy attention on ways to identify or influence them (Evans & Stoddart 1990).

One study has estimated that of the total gain of 25 years in life expectancy for Americans in the 20th century, medical prevention and treatment has added no more than five years, or 20%, of it (Bunker et al. 1994). Other authors also dispute the assumption that the improvement in health in modern times can be ascribed to improvements in health care (McKeown 1979). This does not mean that medical care is unimportant or ineffective, but rather that social determinants may play a greater role in population health than does health care.

Some aspects of medical care have proved to be more closely related to population health and health inequalities than others. Primary care has been linked with improved health outcomes, using evidence at the area-level (Parchman & Culler 1994), and the individual level (Starfield 1985) and with a potential for health care to reduce health inequalities through a redistribution of resources away from secondary/tertiary care towards primary care (Poland et al. 1998).

Most socioeconomically disadvantaged groups tend to use more primary and secondary health services but make the least use of preventive antenatal, immunisation, screening and dental services, while rural residents are less likely to visit the doctor (Salmond et al. 1998). It is still an open question whether the lower uptake of preventive services in these

groups is the result of less access, less information, lower self-esteem or the existence of other more pressing priorities in their lives (Rosenfeld 1997).

One Australian study used evidence from both the area-level and individual levels to demonstrate an association between higher rates of complications of diabetes mellitus with rural location compared to city areas, and with lower rates of visits to GPs in rural areas (Ansari et al. 2000).

Disease inducing behaviours

A great deal of epidemiological research has been devoted to the identification and analysis of disease influencing (and conversely, health influencing) behavioural risk factors in individuals, including tobacco smoking, poor diet and nutrition, physical inactivity, and alcohol and drug use.

However, these behavioural factors explain only a small proportion of the social gradient (Marmot et al. 1984; Marmot & Smith 1989). The original study of British civil servants in Whitehall found that all the major known risk factors for heart disease explained rather little of the social gradient in heart disease deaths (Marmot et al. 1978). In the second Whitehall study, 20 years after the first, no reduction in morbidity by social class was observed (Marmot et al. 1991).

In both the Whitehall studies people in lower grades of employment were more likely to smoke, less likely to be physically active and more likely to be obese. When these factors were accounted for, the social gradient in incidence and mortality due to coronary heart disease and other causes of death still remained. Another study found that, despite the greater frequency of problematic behaviours such as smoking, excessive drinking, weight problems and lack of physical activity among those with lower socio-economic status, these factors explained only 10–20% of subsequent differences by income and education (Lantz et al. 1998).

Controlling for smoking and other behavioural risk factors had little effect on the socio-economic differences in coronary heart disease in a study that looked at differences in health by neighbourhood of residence (Diez Roux et al. 2001). The decline in coronary heart disease mortality in Japan has occurred in spite of evidence that smoking and consumption of dietary fat has increased indicating that factors other than lifestyle are at work (Marmot & Smith 1989).

In addition, individual behaviour, stripped of environmental context, is difficult to alter, as has been shown by the failure of the Multiple Risk Factor Intervention Trial (MRFIT) in the USA to influence health outcomes (MRFIT Group 1982), and evidence from more recent studies (COMMIT Research Group 1995; Susser 1995). A meta-analysis of multiple risk factor interventions concluded that interventions to change risk factors were ineffective in achieving reductions in total mortality or mortality from cardiovascular disease (Ebrahim & Smith 1997).

Where dramatic secular changes have occurred in some health behaviours (such as smoking rates in the Western world in the past two decades) these have been seen as owing more to changes in social determinants (e.g., government policy, legislation and societal norms) rather than as being the product of independent individual decision making (Sorenson et al. 1998). However, one author cautions against taking a simplistic view of this complex phenomenon (Chapman 1993).

An important application of our model will be to facilitate research into the question of why there is a socio-economic gradient in health behaviours. One possibility is that the ability to initiate and maintain health enhancing behaviour is predominantly influenced by psychosocial processes (Bandura 1997), which is a component of the social determinants in our model.

Another application of our model relates to research into which intervention approaches are more likely to be successful in changing behaviours of people from low-SES backgrounds (Marsh & McKay 1994; Coulter 1987). One review concludes that health promotion efforts are not as successful with people from low SES and disadvantaged backgrounds (Turrell et al. 1999). This review did not support the hypothesis that the causal mechanism involved lack of knowledge and more irresponsibility. The key differences were found to be based more on constraints such as "time, space, money". Our model may be used to validate and refine these findings.

Health outcomes

Health outcomes may be measured using a number of data sources. Mortality data can be obtained from death registries, inpatient hospital admission information may be obtained from data abstracted from hospital records, and physician records may be used to assess health status in the primary care setting. In addition, health surveys are an accepted method for ascertaining prevalence of some chronic diseases and their risk factors in the population.

Mortality and morbidity rates can be described using age-specific or age-standardised rates, for all causes combined or separately for different causes. Age-specific mortality rates can be summarised in life tables, which in turn provide life expectancy data or "years of life lost" information.

Mortality and morbidity dimensions of health can be combined in integrated measures of health such as QALYs (quality of life years) and DALYs (disability adjusted life years) (Petrou & Renton 1993; Morrow et al. 1998). The DALY was developed by the Global Burden of Disease

Study and is generally accepted as a useful tool for providing meaningful estimates of population health status. The Global Burden of Disease methodology has been adapted for use internationally, with recent important applications in Australia (AIHW 1999). Self-reported health status may be estimated through multidimensional health status measures and profiles such as the SF-36 (Hemingway et al. 1997).

Despite the disparate nature of alternative measures of health status, a systematic review of Australian research into SES and health concluded that the evidence connecting SES and health was unequivocal and also that the strength of this relationship persisted irrespective of how SES and health were measured (Turrell et al. 1999).

The Turrell and Oldenburg (1999) review also provided evidence that some breast and colorectal cancers seem to be disproportionately concentrated among persons from higher SES (Turrell et al. 1999). Our model may be useful in examining exceptions to the usual trend for persons of low SES to develop more disease than those from more affluent backgrounds. The model also emphasises the importance of continuing to seek more robust population health outcomes measures at both the individual and aggregate level for identifying opportunities for targeted interventions for reducing health inequalities in the population.

Analyses facilitated by the model

Levels of analysis

The model encompasses variables from the individual level, pertaining to characteristics of individuals in the population, to the ecological level, pertaining to characteristics of groups or communities of people. It has previously been common practice in risk factor epidemiology to avoid the analysis of ecological variables, since it had been wrongly assumed that studies with an ecological dimension always provide, at best, only a poor substitute for individual level analyses. Investigations including ecological variables have been rejected as being subject to bias resulting from the attribution of causal processes at the individual level on the basis of associations observed at the aggregate level (Morgenstern 1995). It has now been recognised that when ecological variables are collected and analysed for their own unique effects (rather than as proxies for individual level variables), useful and valid results may be obtained (Schwartz 1994).

The opportunity must now be accepted to include individual and ecological level measures in the same analysis. The simplest method, often called contextual analysis, is a simple extension of conventional modelling such as multiple linear regression or logistic regression, in which both individual-level and ecologic predictors are included in the model (Von Korff et al. 1992). A limitation of contextual analysis is the likely violation of the assumption that error terms are random, independent and uncorrelated with any other variable (such as higher level group membership), causing the estimated confidence intervals to be wider than they should be (Rothman 1998).

In order to overcome the statistical shortcomings of contextual analysis, newer statistical techniques such multi-level models, random-effects models and hierarchical regression models have been developed to allow for the consequences of within-group clustering, so that both individual-level and aggregate-level variables may be included and appropriately analysed (Austin et al. 2001).

Causal models

Epidemiology assigns a variable (X) to be one of four types:

- exposure $X \rightarrow Y$ *X is the cause*
- outcome $Y \rightarrow X$ *X* is *the effect*
- confounder $\overset{\frown}{X}$ $Y \rightarrow Z$ *X is associated with both exposure and outcome and is treated as a nuisance whose influence on outcome is to be removed for causal inference*
- effect modifier X $\downarrow$ $Y \Rightarrow Z$ *an interaction between X and the exposure which produces a heterogeneity of effect on Z dependent on the level of X*

The components of the model (Fig. 1) have been classified into four broad groups: social determinants (S), health care system (C), disease inducing behaviour (B), and health outcome (H) to explain possible causal pathways in the analyses of social determinants as they relate to health inequalities. Recognition is given to the need to study the relationships between all four components. The need to incorporate social determinants in the model is emphasised by the population health perspective (as advocated by the eminent epidemiologist Geoffrey Rose) (1994). The population health approach recognises that "an individual's risk of illness cannot be considered in isolation from the disease risk of the population to which she belongs" (Berkman & Kawachi 2000) and that "the causes of individual variation and the causes of variation between populations and time periods may be distinct" (Schwartz & Carpenter 1999).

Alternative models in risk factor epidemiology have tended to ignore social determinants as legitimate epidemiological topics of investigation, not because their effects are small, but because they are considered to be unmodifiable, outside the scope of epidemiology or not in alignment with local or

Table 2 Analysis strategies in exploring associations between social determinants and health

Analysis strategy	Causal path	Exposure	Outcome	Effect modifier	Confounder	Research focus
A	S → H	Social determinants (S)	Health outcome (H)	–	–	Direct effect of social determinant(s) on health e.g. – influence of low social status on biochemical correlates of chronic stress; – influence of social capital on population health
B	S → B	Social determinants (S)	Health behaviour (B)	–	–	Increased frequency/severity of illness and injury inducing behaviour in lower socio-economic groups
C	S → C	Social determinants (S)	Health care (C)	–	–	Inferior access by low-SES groups to health care services (especially primary care)
D	S ↓ B → H	Health behaviour (B)	Health outcome (H)	Social determinants (S)	–	Social determinants have an influence such that the same level of health behaviour causes an unequal health outcome, depending on the level of social determinant(s)
E	S ↓ C → H	Health care (C)	Health outcome (H)	Social determinants (S)	–	Social determinants have an influence such that the same level of health care causes an unequal health outcome, depending on the level of social determinants
F	S C → H	Health care (C)	Health outcome (H)	–	Social determinants (S)	The effects of health care (systems and interventions) on health status, treating social determinant(s) as nuisance variables
G	S B → H	Health behaviour (B)	Health outcome (H)	–	Social determinants (S)	The effects of health behaviour on health status, treating social determinant(s) as nuisance variables

jurisdictional policies or political directions (Schwartz & Carpenter 1999). Their inclusion would help to build a better bridge between epidemiology and the field of public health in the real world.

Analytic strategies for describing the influence of social determinants on health are summarised in Table 2. We argue that while strategies F and G may sometimes be appropriate, they should be used with caution, because they imply an approach to epidemiology in which social determinants are *a priori* assigned the limited role of confounder, either because they are assumed to have no substantive health effects, or because they are thought to be unmodifiable. Analyses of social determinants as predictors of inequalities in health in the population are proposed in strategy A. Disease inducing behaviours and the healthcare system attributes can be considered as potential confounders and adjusted in the analyses. In addition, the model also facilitates examination of the impact of social determinants on disease inducing behaviour and health care system (strategy B & C). This can assist in describing the impact of social determinants on disease inducing behaviours and attributes of healthcare system, as well as providing a complement to strategy A. Social determinants may have an influence such that the same levels of disease inducing behaviours and various attributes of the healthcare system cause an unequal health outcome, depending on the level of social determinants. This model helps in these analyses through strategies D and E. As these strategies can be complementary, strategy A can also be combined with B and the risk factor approach G.

In this combined strategy, the influence of social determinants may be partitioned into direct and indirect effects (via health behaviour) on health outcomes. Appropriate statistical tools to analyse such an approach include path analysis, structural equation models (SEM) and other multi-stage regression methods (Loehlin 1991). These techniques are commonly used in sociological research but have been comparatively rarely employed in epidemiological investigations, and deserve careful consideration for their potential use in connection with the analysis of our model.

Conclusions

Several potential applications of the model discussed in the paper are summarised in Table 3. A theoretical framework has been provided that will assist in the design of new epidemiologic studies exploring the impact of social determinants on health outcomes in populations. The nature

Table 3 Potential applications of public health model of the social determinants of health

- Provide a theoretical framework for designing new epidemiologic studies in public health and health services for exploring the impact of social determinants on health outcomes in populations.
- Assist in exploring the influence of social determinants on health, by providing a framework for understanding the nature of causal pathways linking social determinants, disease inducing behaviour, health care systems and health outcomes.
- Provide an opportunity for identifying the associations between socio-economic determinants, psychosocial factors and community and social characteristics.
- Facilitate analyses evaluating the role of social determinants as causes of adverse health outcomes, increased level of disease inducing behaviours, and impaired access to and utilisation of health care services.
- Facilitate analyses evaluating the role of social determinants in modifying the risk of adverse health outcomes caused by disease inducing behaviours and impaired access to and utilisation of health care services.
- Provide a framework for the application of statistical methods at multiple levels of analysis (individual and group).
- Provide a tool for developing surveillance systems particularly in relation to chronic diseases.
- Assist policy and planning for the development of appropriate public health and health care interventions to address inequalities in health outcomes.

of causal pathways linking social determinants, disease inducing behaviours, health care system attributes and health outcomes has been clarified. We have also described the inter-relationships between socio-economic determinants, psycho-social factors and community and societal characteristics. A greater focus on distal factors with conceptual and methodological underpinnings provided by our model is likely to open more possibilities for prevention than concentrating on more traditional proximal factors by strengthening the link between the work of epidemiologists and their public health colleagues.

Zusammenfassung

Ein Public-Health-Modell der sozialen Gesundheitsdeterminanten

Mit dem fortschreitenden neuen Jahrhundert sehen sich Epidemiologen und Fachkräfte in der öffentlichen Gesundheitspflege der Herausforderung gegenüber, die gegenwärtige Ausrichtung der Epidemiologie und die Zusammenarbeit mit der öffentlichen Gesundheitspflege zu überdenken. Die geschichtliche Entwicklung der Epidemiologie war sehr erfolgreich und produktiv. Nun besteht aber die Gefahr, dass sich der Anwendungsbereich der modernen Epidemiologie zu sehr auf die individuelle Risikofaktorenanalyse beschränkt, während soziologische und ökologische Gesundheitsaspekte ausser Acht gelassen werden. Wir argumentieren, dass es einen wegweisenden theoretischen Rahmen für die praktische Epidemiologie braucht. Dieser umfasst soziale Gesundheitsdeterminanten und berücksichtigt gleichzeitig die Bedeutung von Verhalten und Biologie und alle zwischen diesen Faktoren bestehenden Verknüpfungen. Diese Publikation präsentiert ein Public-Health-Modell, das auf sozialen Gesundheitsdeterminanten beruht und das einen Rahmen zur Überprüfung kausaler Zusammenhänge von Variabalen der sozialen Determination mit Eigenschaften des Gesundheitswesens, krankheitsverursachenden Verhaltensweisen und den gesundheitlichen Folgen liefert. Dieser Ansatz bietet eine verbesserte Möglichkeit Evidenz-basierte Public-Health-Interventionen zu identifizieren und zu evaluieren und ermöglicht eine bessere Verbindung von der moderenen Epidemiologie und der öffentlichen Gesundheitspraxis.

Résumé

Modèle de santé publique sur les déterminants sociaux de la santé

En entrant dans ce nouveau siècle les épidémiologistes et les professionnels de la santé publique sont confrontés au défit de revoir l'orientation actuelle de l'épidémiologie et ses liens avec la santé publique. Alors que l'histoire de l'épidémiologie a été couronnée de succès et productive, il y a danger que l'épidémiologie moderne devienne trop réduite dans ses objectifs, préoccupée avant tout par l'analyse de facteurs de risque individuels et ignorant les points de vue sociologiques et écologiques sur la santé. Nous défendons l'idée qu'un cadre théorique est nécessaire pour guider la pratique épidémiologique. Ce cadre doit prendre en considération les déterminants sociaux de la santé tout en reconnaissant l'importance du comportement et de la biologie, ainsi que les connexions entre ces différents facteurs. Cet article présente un modèle de santé publique des déterminants sociaux de la santé, qui offrent un cadre pour tester des hypothèses sur des circuits causaux reliant des déterminants sociaux à des caractéristiques du système de santé, des comportements pathogènes et des états de santé. Cette approche accroît les chances d'identifier et d'évaluer des interventions de santé publique basées sur des preuves et favorise l'établissement de liens plus solides entre l'épidémiologie moderne et la pratique de santé publique.

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Address for correspondence

Zahid Ansari, MBBS, MPH, MS
Health Surveillance and Evaluation Section
Public Health Group (PHG)
Department of Human Services (DHS)
18/120 Spencer Street
Melbourne, Vic 3000 Australia
Tel.: +61 3 96374242
Fax: +61 3 96374763
e-mail: zahid.ansari@dhs.vic.gov.au