Chronic Kidney Disease and Life Course Socioeconomic Status: A Review

David A. Shoham, Suma Vupputuri, and Abhijit V. Kshirsagar

Socioeconomic status (SES) may modify the effect of well-established risk factors on the development of kidney disease. Yet, recently, a paradigm shift has occurred with an emphasis on the direct effect of SES on the development of disease. This article covers the role SES may play in initiating and promoting chronic kidney disease (CKD) in the United States, with an emphasis on life-course SES. The literature on SES and kidney disease is discussed. Life-course and social epidemiology approaches are described. Salient risk factors and markers that are associated with both SES and kidney disease early in life include diet, birth weight, and infant mortality. Risk factors associated with individual SES later in life include diabetes mellitus, hypertension, diet, smoking, alcohol, drug use, occupational and environmental exposures, infection, and access to health care. An argument is made for incorporating area-level SES measures. Future research should incorporate both individual and area-level SES and be placed in the context of the life course.

Index Words: Social class; socioeconomic status; renal insufficiency; epidemiology; life course

Despite an understanding of the major risk factors for chronic kidney disease (CKD) and of the benefits of risk factor modification, the incidence of end-stage renal disease (ESRD) continues to rise. Socioeconomic status (SES) may modifying the effect of well-established risk factors on the development of kidney disease. Yet, recently, a paradigm shift has occurred that places an emphasis on the direct effect of SES on the development of disease. Our article covers the role SES may play in initiating and promoting CKD. Our emphasis is on life-course SES. We focus on studies relevant to the United States. Cass et al[1] have recently written an excellent article on SES and kidney disease among indigenous Australians. Our article identifies initiating and promoting factors that may be the target of primary and secondary prevention strategies for the development of CKD.

Making a Case for the Direct Role of SES in Health Disparities

Socioeconomic status has long been regarded as a key determinant of health. In the nineteenth century, Virchow in Germany, Villermé in France, and Farr and Engels in England systematically explored the relationship between social conditions and health.[2,3] Under Chief Medical Officer T.H.C. Stevenson, the British General Register Office introduced an ordinal 5-part occupational classification in 1911, ranked from low (class I) to high (class V). The creation of an ordinal scale of occupations has allowed contemporary British researchers to show a strong inverse social gradient in disease that continues to follow Stevenson's original scale.[4,5] These findings could not be explained by availability of health care, as the British have long had a system of socialized medicine. Furthermore, adjustment for biomedical and lifestyle risk factors only slightly reduced the association between social class and disease, indicating an independent psychosocial association between class and health. The robustness of this relationship is particularly striking for coronary heart disease.[5,6]

The persistence of the social gradient in health in nations with high per capita incomes, such as the United Kingdom and United States, has shifted the focus from individual-level attributes to attributes of the social system as a whole. Late in the nineteenth century, Emile Durkheim argued that suicide rates were a function of social determinants that could not be reduced to individual attributes.[7] Durkheim posited the existence of

From the Department of Epidemiology, and the Division of Nephrology and Hypertension, Department of Medicine, University of North Carolina, Chapel Hill, NC.

Address correspondence to David Shoham, MSPH, CB# 7155, UNC-CH, Chapel Hill, NC 27599. E-mail: shoham@email.unc.edu

1548-5595/05/1201-0009$30.00/0

doi:10.1053/j.ackd.2004.10.007

"social facts," which he defined as "any way of acting. . . which is general over the whole of a given society whilst having an existence of its own, independent of its individual manifestations."[8]

Continuing Durkheim's focus on social explanations, Rose[9,10] argued that epidemiology should be concerned not only with the "causes of case" but also with the "causes of incidence"; that is, the underlying social forces that shape the incidence of diseases in populations.[9,10] Link and Phelan[11] have echoed Rose's population approach by calling for researchers to view social conditions as "fundamental causes" of disease and to search for the "factors that put people at risk of risks."[11] The relationship between social conditions and health is, thus, more than a proxy for particular exposures, rather, social conditions between populations—and social status within a given population—shape life circumstances that put people at risk.

Social Epidemiology of Kidney Disease

Few studies in the United States and elsewhere have looked at the role of nonracial socioeconomic factors in initiating or promoting kidney disease. Krop et al[12] found that individuals who live in households with incomes below $16,000 per year have 2.38 times the risk of early kidney function decline as those who lived in households making at least $35,000 per year; individuals with less than a high school education had 1.67 times the risk of kidney function decline as those with a college education.[12] Klag et al[13] found that the median income of a subject's neighborhood was associated with elevated serum creatinine. A case-control study by Fored et al[14] in Sweden found that individuals with CKD had 1.6 times the risk of being unskilled manual workers as those without kidney failure (reference: professionals). Furthermore, individuals with CKD had 1.4 times the risk of having low educational attainment (reference: over 12 years of education). These associations persisted after adjustment for age, sex, body mass index, smoking, alcohol consumption, and analgesic usage.

A Life-Course Approach to Chronic Kidney Disease

Epidemiologic studies have traditionally relied on static notions of risk factor exposure. Social epidemiology tends to follow the traditional approaches of case-control and cohort studies; subjects are only asked about their current social status. These approaches ignore the potential contribution of exposure to risk factors at critical periods in life and the possible cumulative effect of exposure on disease risk.[15] A more refined approach is to ask subjects about their parents' and their own socioeconomic status at specific points in their lives, that is, to take a life-course approach.

The life-course approach has been applied to sociology[16,17]and epidemiology.[18,19] In the sociological sense, the life course may be conceived of as the "social trajectories of education, work, and family that are followed by individuals and groups through society."[17] The field of status attainment research is explicitly focused on the degree to which social mobility is promoted or constrained across generations and within individual birth cohorts. A variety of empirical techniques are used to assess the "structuration" (class-boundedness) or "fluidity" (equality of opportunity) of society.[20,21] Sociologists debate structuration and fluidity, but the existence of relative inequality in opportunity and achievement across generations is not disputed.[22] Therefore, parental SES must be taken into account whenever one is interested in a potential effect of individual SES on an outcome.

The epidemiologic approach to the life course follows the sociological model. Kuh et al[18] state that "health-damaging exposures or health-enhancing opportunities are socially patterned"; that is, the exposures and opportunities "are constrained by various forms of social stratification." These patterns must be taken in geographic and historical context, as the forms of social stratification may change over time.

Kuh et al[18] provide a simple framework for linking SES across the life course; they conceive the social environment having a cumulative effect. The childhood socioeconomic environment influences educational opportu-