

**Socioeconomic Status and Class in Studies of
Fertility and Health in Developing Countries***

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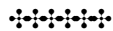
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SOCIOECONOMIC STATUS AND CLASS IN STUDIES OF FERTILITY AND HEALTH IN DEVELOPING COUNTRIES

ABSTRACT

The concepts of socioeconomic status (SES) and class are pervasive in sociological studies, yet an examination of the sociological and social science literature suggests that there is a lack of consensus on their conceptual meaning and measurement. Our review focuses on the use of SES and class in a specific substantive field, studies of *child health* and *fertility* in developing countries. We provide a brief review of the theoretical literature on SES and class, contrasting unitary and component views. We then examine the use of SES and class in empirical studies of child health and fertility in developing countries and investigate the relationship between the conceptual and empirical literature, highlighting the inconsistencies we find. In addition, we discuss the variety of meanings and measures of SES that researchers use in these studies. Next, we address a series of methodological issues that arise from the review. Finally, we make recommendations for the treatment of SES and class in these and related areas.

SOCIOECONOMIC STATUS AND CLASS IN STUDIES OF FERTILITY AND HEALTH IN DEVELOPING COUNTRIES

Few concepts are as central to sociology as are those of socioeconomic status (SES) and class. Whether it is theories of the class structures conducive to democratic development at the macro level (e.g., Therborn, 1977) or micro studies of social capital (e.g., Parcel and Menaghan, 1994) or depression (e.g., Link, Lennon, and Dohrenwend, 1993), socioeconomic status or class are sure to play a key role in the analysis. Given the saliency of the concepts and their intense examination over time, we might expect that a consensus has formed around their conceptual meaning and their optimal operationalizations. Yet an examination of the sociological and social science literature suggests otherwise and the need to investigate their usage.

The number of studies employing class or SES measures is vast and this makes an attempt at reviewing all such works futile. However, an examination of SES and class in a specific substantive area is both feasible and desirable. It is desirable in that it grounds the research in a concrete problem rather than trying to generalize to numerous, quite different areas. At the same time, some of the findings about the typical ways that SES and class are defined, their measures, and their use represent practices that extend far beyond the specific substantive area. So in addition to providing information on the use of SES and class in a specific field, the review holds lessons for researchers who apply these concepts in other areas. With this in mind, our review concentrates on the use of SES and class in studies of *child health* and *fertility* in developing countries. These topics are key ones in sociology, public health, population, economics, and other social science disciplines. The relationship between life chances and life expectancy and differential fertility is self-evident. Our choice of outcomes has the advantage of not only enabling us to understand how sociologists are using SES and class, but it also reveals

the practices in neighboring disciplines who share our interests and are both an influence on, and influenced by, the use of these concepts in sociology.

Measures of SES and class vary widely both within and between disciplines regardless of the outcome. This is problematic for a number of reasons. First, it leads to ambiguity in interpreting model results. For instance it is often difficult to determine whether SES or class operates as a unitary or a multidimensional construct. Moreover, we do not know if different conclusions would be drawn if different measures were employed. Second, a series of methodological problems emerge. Imperfect measurement of SES or class can bias coefficients for the SES variables as well as all other explanatory variables. This is true regardless of whether SES is used as a central or control variable. These problems are exacerbated because we have little guidance on how to treat SES in empirical work. In fact, empirical implementations of SES and class are often driven by data availability and the empirical performance of indicators as much as they are by theoretical groundwork.

We have several purposes in writing this review. The first is to provide a brief conceptual review of SES and class. Second, we will review the use of SES and class in empirical studies of child health and fertility in developing countries. Then we examine the relationship between the conceptual and empirical literature. Third, we will highlight the inconsistencies we find. Our review of the literature seeks to shed light on current practices on several levels: is SES unidimensional or multidimensional conceptually?; if SES consists of components, then what are the key components?; and how often is the conceptual meaning of SES/class missing from or mismatched with the empirical implementation? Fourth, we address methodological issues that arise in reviewing the use of SES and class. Finally, we will make recommendations for the treatment of SES in these and related areas.

CONCEPTS AND MEASURES OF SES AND CLASS

The concept of class has a long and venerable history in sociology. In contrast, the term socioeconomic status, which is so widely used today, appears to have become commonplace only after the U.S. Census Bureau published a report in 1964 using a composite SES index for comparison of different groups. The motivation underlying their creation of an index of SES, constructed from unweighted data on education, income, and occupation, was to distinguish a broader level of socioeconomic differentiation which affected behavior and was insufficiently demonstrated using single, bivariate tabulations as commonly found in census reports (US Census Bureau, 1963). This practical development of SES in empirical work was at the same time influenced by theoretical research including Lenski, Blau, Duncan, and others.

No one theory has a monopoly on the meaning of SES or class. Socioeconomic status (SES) usually refers to the position of individuals, families, households, or other aggregates on one or more dimensions of stratification. These dimensions include income, education, prestige, wealth, or other aspects of standing that the members of society deem salient. In a Marxian sense class refers to groups that have a similar relation to the means of production in a society. But sometimes class refers to a concept close to SES in its multidimensional conception. Other times class highlights a specific aspect of SES such as occupational standing. All too often SES and class are ambiguous terms that serve as a shorthand expression to refer to social and economic characteristics that are thought to be important, but whose rationale or meaning is not always made clear.

There are nearly as many concepts of socioeconomic status and class as there are authors writing on them. But distancing ourselves from the particulars of each work, it is possible to discern two broad approaches. The first conception sees class or, more rarely, SES as essentially

a *unitary* concept. From this perspective, there is a fundamental dimension that underlies class (or SES) and it is this dimension that is the primary driving force in using class in analyses. The second viewpoint focuses on the *components* of SES or class and treats them as having distinct effects. This conceptualization disputes the unidimensionality of class or SES. It highlights the separate dimensions of stratification and predicts that different dimensions can have different consequences. We briefly describe each of these conceptualizations and typical ways in which they are operationalized below.

Unitary Concepts and Measures

The unitary concept of class is most closely associated with the work of Marx. The key axis to his theory is a group's *relationship to the means of production*. In agrarian societies the primary classes were the land-owners and the peasants (Marx and Engels, [1848] 1978). The primary class actors in industrial capitalist societies were the owners of the means of production, the bourgeoisie, and the workers, the proletariat. Though Marx acknowledged the existence of other classes such as landowners, he asserted that unlike the bourgeoisie and proletariat who were the driving forces of history in this epoch, they had no major role in generating changes in social organization (Marx, [1894] 1978). The developing countries that are of most concern to us are hybrid societies that stand between the agrarian and industrial societies and hence reflect the concurrence of class features from each societal type (Lenski, 1966).

Much of the work in the Marxist tradition of analyzing class structures has been comparative historical, targeted at macro-level analyses instead of micro-level outcomes (e.g., Moore, 1966). The work of Wright (1997; Wright et al., 1982) is the principle contemporary attempt to measure class positions empirically from a Marxist perspective, and these measures

enable the examination of the effects of class on micro-level outcomes such as health and fertility. Wright's categorization of class emphasizes the exploitation inherent in the social relations of production. Specifically, he categorizes workers according to (1) ownership, (2) authority, and (3) expertise (Wright, 1985). All three axes represent a type of exploitation. Workers can be high on one axis and low on another, which is sometimes referred to as "contradictory locations."

Another measure of "social class", the British Registrar General's scale, has been the most widely used measure of status in studies of health and mortality in the United Kingdom (see for example, Marmot et al., 1991). The occupation of the head of the household is placed in one of five social classes: I, professional; II, intermediate; III, skilled (non-manual and manual); IV, partly skilled; and V, unskilled.¹ As commonly used as a single measure, this measure reflects a unitary construct. A comparable scale for the U.S. is the Edwards Social-Economic Grouping of Occupations (Liberatos et al., 1988). Here, occupations are compiled into major groups based on the average income and education required by the occupation.

Shared among these conceptions of class is the idea of class being distinguished by categories rather than by continuums. The SES traditions represent an emphasis on continuous variables. For example, Duncan's (1961) socioeconomic index (SEI) is a common continuous measure of occupational standing in U.S. studies. This index is based on the average educational attainment and income in an occupation. A large proportion of the U.S. research in social stratification has used SEI to evaluate the extent of intergenerational mobility, but SEI scores have also been included in predicting numerous other outcomes. While the SEI scale itself

¹ Though occupation is often used interchangeably with class, Wright et al. (1982) insist that a Marxist operationalization of class should not be based on occupation. A great deal of variation across the axes of exploitation can exist within an occupation.

reflects a unitary construct at the level of occupations, because it is often used as a component of the SES of individuals, we return to this scale in the next section. Another common index that is often used as a unitary measure of SES is Hollingshead's Two Factor Index of Social Position published in Hollingshead and Redlich (1958) which combines education and occupation.² This measure reflects the notion that SES is a unitary concept.

A number of more idiosyncratic indexes exist. Some data sets, such as High School & Beyond (HSB), include a SES index as a 'canned' measure that is a composite of SES components designed to be easily incorporated by researchers using the data set. The measure in HSB, for example, is based on family income, mother's and father's education, father's occupation, and material and educational possessions owned by the household. There has also been some exploration of general SES indexes for developing countries. Employing Warner's scale as a model, Karim (1990) used characteristics of the dwelling, educational attainment of household members, occupation of household head, possession of a number of household items, membership in a cooperative, self-perception of class, amount of land owned, and food self-sufficiency to develop a scale for Bangladesh. From these variables he constructed a scale based on all the variables whose correlations with the other SES variables were statistically significant. Cortinovis, Vella, and Ndiku (1993) use multiple correspondence analyses to develop a SES index for Uganda. They construct this from a host of variables representing housing quality, literacy and cultural, demographic conditions, and economic conditions with the aim of developing an index for a survey of nutrition and health. In an exploration of the consequences

² Although this scale has been widely used, Hauser and Warren (1997) caution against it because Hollingshead developed his occupational rankings based on a case study in New Haven, Connecticut. Some of his decisions on where to rank occupations were based on his judgment of the status of individuals within the community, which makes it a questionable measure for use outside of that particular city.

of maternal education on fertility and child survival in Mexico Levine et al. (1991) employ an index of SES that includes husband's education, husband's occupational status, basic household services, and appliances owned. Despite these few cases of an index of SES being created for use in analyses of developing countries, this type of index is not common, as our literature review will demonstrate.

Economists have not been as likely as sociologists to view SES as a unitary construct. However, a strange bedfellow that shares Marx's emphasis on a unitary concept, though from quite a different perspective, is economist Milton Friedman. We refer to Friedman's permanent income hypothesis, one of the most influential economic ideas of the 20th Century. Friedman offers a model to explain the relationship between consumption and income for individuals and aggregates. Essentially, Friedman states that income is composed of two components: permanent and transitory. "The permanent component is to be interpreted as reflecting the effect of those factors that the unit regards as determining its capital value or wealth: the nonhuman wealth it owns; the personal attributes of the earners in the unit, such as their training, ability, personality; the attributes of the economic activity of the earners, such as the occupation followed, the location of the economic activity, and so on." (Friedman, 1957, p.21). Friedman suggests that consumption behavior is primarily determined by permanent income, a conceptual notion of income that differs from measured income and is never actually observed. According to Friedman, part of the reason that the correlation between consumption and income is not strong is that income is a poor measure for permanent income. He states, "some of the most strikingly uniform characteristics of computed regressions between consumption and income are simply a reflection of the inadequacy of measured income as an indicator of long-run income status" (1957, p.37).

Permanent income is a theoretical concept and is not readily measurable. Enormous effort has been undertaken over the years to develop proxy measures of permanent income. Since expenditures are generally considered to be less variable than income, annual household expenditures are often used to proxy permanent income (Deaton, 1992). While researchers employ a permanent income proxy when studying longer-term outcomes, they often use transitory income and measures of uncertainty when they focus on shorter-term outcomes. An example is that permanent income may be related to child stunting, which is an outcome that takes a longer period of time to develop. Transitory income may have a stronger relationship with child wasting, which is a more severe, short-term measure of child health. In many ways, permanent income or its proxy is assumed to operate very much like a class or SES variable by capturing the consumption behavior that is based on the attributes of the earner, not simply last period's income.

Proxies for permanent income are also to be found beyond traditional income estimates if they are believed to be more closely associated with long-term economic status. Occupation is particularly popular as a proxy for permanent income. The importance of occupational categories in the permanent income hypothesis is highlighted by Friedman (1957) and occupation is also tested as a proxy in Houthakker (1957) and Mayer (1963). In addition, Zimmerman (1992) demonstrates that occupation is a better predictor of generational immobility than income measured at one point in time. Sociologists have also suggested that occupation is a good proxy for permanent income (Hauser and Warren, 1997). Nevertheless, recent economic studies are more likely to use asset measures and lagged income variables to capture permanent income (see Deaton, 1992). At the same time, innovative studies have attempted to use measures such as

adult height in historical studies when income is unavailable (Steckel, 1995) or to capture unobserved family background (Thomas et al., 1990).

Component Concepts and Measures

The second major formulation of class and SES is what we label the *component* approach. In contrast to the unitary view, the component perspective is that the stratification system has a number of distinct dimensions. Though some authors highlight one dimension over the others, most scholars who share this outlook suggest that each component is capable of exerting separate effects. Weber is the sociological theorist most often associated with this outlook. Weber's (1946) classic essay, "Class, Status, and Party" is one of his most concise statements on this issue. In it he argues that class (economic position), status (prestige), and party (political power) represent interrelated yet distinct dimensions of stratification, providing a corrective to Marx's economic determinism. While economic position can affect prestige and power, prestige and power can both influence one another and economic position.

Typically, sociologists who hold a component perspective on the measurement of SES employ a series of measures, most commonly some measure of education, income, and occupational standing. For example, research in the status attainment tradition reflects attention to the distinct effects of the various aspects of stratification (e.g., Hauser, 1972). Models from the Wisconsin school often examine the effects of parental education, income, and occupation on the subsequent socioeconomic outcomes of their children separately. Several studies have found that the direct effect of father's occupational status on son's occupational standing is larger than its effect on son's earnings, and similarly, father's earnings have a larger effect on son's earnings than father's occupation does (Hauser, 1972; Hauser, Tsai, and Sewell, 1983).

Status attainment and other American research often employs the SEI scale as the measure of occupational standing. However, we must ask if it is reasonable to combine income and education at the aggregate level of occupations when their unidimensionality at the individual level has been called into question. Indeed, recent research on the SEI index cautions against its use in predicting diverse outcomes in favor of examining the effects of disaggregated occupational characteristics. Hauser and Warren (1997) find that the weights attributed to occupational education and income are model-dependent (which they show in structural equation models predicting prestige and other socioeconomic outcomes). The relative weights of occupation and education might also differ for other outcomes including health. In fact, they conclude their article with:

If there is any general conclusion to be drawn from the present analysis, it is that we ought to move toward a more specific and disaggregated appraisal of the effects of occupational characteristics on social, psychological, economic, political, and health outcomes. While composite measures of occupational status may have heuristic uses, the global concept of occupational status is scientifically obsolete (p. 251).

Economists have also played an important role in developing many of the concepts of SES and its various components. While it is true that economists are less likely to use the term “SES” or “class”, they nonetheless use many of the same variables as are generally included in these categories, such as various forms of income and assets, education, and less frequently, occupation. Of course, economists have generally emphasized the role and measurement of economic resources. However, other aspects of SES are no longer felt to be outside the domain of economics. In most cases, the dimensions of SES are clearly incorporated as separate components rather than multiple aspects of a single, unitary concept. The transparency of this approach follows from the tendency towards presenting hypotheses as mathematical conjectures

and requiring authors to define the exact role of SES and other exogenous and endogenous variables of the model.

In its basic form, the standard neoclassical model posits a representative agent (usually a household or individual) seeking to maximize a utility function in the face of a resource constraint. When the utility function includes factors such as child education and health, which are not only produced in the market but also depend on home production, production functions are used to describe the relationship between inputs and such outcomes. The utility function generally includes those variables to be chosen by the household or individual. Despite the recognition that preferences may be shaped by SES, economists do not often attempt to model different preferences within the population. However, they do tend to include SES controls in their statistical models. In addition, many econometric methods have been developed for controlling unobserved factors that may be correlated with choice variables, such as child health or fertility. While there are many less traditional approaches, two approaches to incorporating SES and its various components are especially common: various income and endowment measures are included in the resource constraint, the production technology, or both.

The simplest approach is when the utility function does not include SES factors and the various sources of income implied in the resource constraint are the only aspects of SES included in the model. When income is defined as permanent income, as discussed earlier in terms of Friedman's work, the treatment of SES is best defined as unitary. When income captures various distinct elements, then it may be better labeled as component. Empirical studies normally resort to multiple measures, even when intending to capture the unitary permanent income concept. In contrast to many non-economists who typically include a single measure for household or individual income, economists prefer to divide income categories into specific groups according

to their source, including wage income, rental income, transfer income and other potential sources. Research by economists has demonstrated that these various sources of income have different effects on household behavior. For example, Haddad and Hoddinott (1995) use data from Côte d'Ivoire to show that when women bring in a greater share of the household income, the household budget is shifted towards food and away from alcohol and cigarettes. Other important theoretical concepts have also been tested including altruism among family members (Cox 1987; Cox, Eser, and Jimenez, 1998), bargaining within the household (McElroy and Horney, 1978) and whether savings are motivated by a desire to leave bequests, or whether they are the result of individuals accumulating a reserve of resources to use during retirement (Kotlikoff and Summers, 1981; Modigliani, 1986).

The simple model we described above where SES is only incorporated through the resource constraint is less common today, particularly in models focusing on health or fertility as outcomes. In such models, one often finds household utility functions that include some non-market produced outcome such as child health or education. In their classic article of 1974, Becker and Lewis introduce terms for child quality in the utility function which are implicitly the result of household production decisions and depend on household endowments which allow households to produce quality more efficiently. Following Becker (1965; 1981) and Willis (1973), economists have increasingly turned towards incorporating explicit production functions to describe the process for generating non-market outcomes in the utility function. These production functions normally depend on individual and household endowments – many of which are unobserved – as well as community characteristics (Schultz, 1997). Among the most researched of the parental characteristics are SES variables such as maternal and paternal education and income from any of several sources.

The econometric literature flowing from this conceptual approach has shed some important light on the potential effect of SES variables, not all of which supports a component perspective. A review article by Strauss and Thomas (1995) provides insight into the recent econometric literature on health and fertility in developing countries, which has been a particularly active area of research by economists. The studies in their review suggest that much of the variation in fertility and health behavior and outcomes can be attributed to unobserved background variables that are specific to individuals, families and communities, and not to specific SES factors. One result of particular importance is the common finding that questions the much heralded role of maternal education (Strauss and Thomas, 1995; Behrman and Wolfe, 1987).

Ambiguous or Mixed Concepts and Measures

The preceding discussion portrays the distinction between the unitary and component concepts of SES as cleaner than they are in practice. In reality, SES and class are too often used ambiguously and casually, referring to education or income in one study or to an index based on only occupation in another. It is not uncommon for researchers to refer to the impact of SES in a general sense as something that “needs to be controlled”, but in the empirical analysis to just include a single component (e.g., education) to control for SES. We give some examples in our review of the role of SES in the health and fertility literature. In practice, often indicators of SES are used interchangeably as functional equivalents based on the ready availability of measures. Using income and education in one study and education and occupation in another both as controls for SES suggests that both sets of variables tap the same underlying concept.

Alternatively, another hybrid approach is to hold a component view of stratification, but to highlight only one or two components as the key ones to analyze.

Class and SES in Developing Countries

The bulk of the research on defining and measuring SES and class derives from the experiences of industrial countries. The degree to which these findings and conceptualizations carry over to developing countries is an open question. Consider occupation. Given the centrality of jobs in the daily lives and economic fates of most people, a great deal of attention has been devoted to classifying occupations in industrial countries in ways that meaningfully capture status. A reflection of this emphasis are the many different measures of occupational standing including: prestige scales (Nakao and Treas, 1991), socioeconomic indexes (Duncan, 1961; Hauser and Warren, 1997), job desirability indexes (Jencks, Perlman, and Rainwater, 1988), and class-based groupings of occupations based on the social relationships of production within occupations (Erikson and Goldthorpe, 1992). Many British studies of socioeconomic inequalities in health have used occupational group as the primary measure of status (e.g., Townsend et al, 1988; Wilkinson, 1986).³

Occupational status has received relatively little attention in studies of population and health outcomes in developing countries, primarily due to somewhat constrained labor market conditions. One exception is Bills, Godfrey, and Haller (1985) who develop a scale of occupations for Brazil based on occupational income and education, but this approach has not been widely adopted. Given the importance this component of SES has in industrialized

³ Recently Miech and Hauser (1998) have examined the role of occupational status in health for a U.S. sample, though they did not find strong effects.

societies, it is worth further consideration in developing country settings, especially as they become increasingly urban and industrialized. In addition, we can refine agricultural status indicators to reflect the variation between capital and labor buyers and sellers, and such distinctions may prove fruitful in more fully capturing SES. Overall there is a need to determine the degree to which the treatment of SES and class that is typical in industrial countries is useful in less industrialized or more mixed technological societies.

Review of SES and Class in Child-Health and Fertility Studies

Our objective in the literature review is to examine articles representative of current practice in the use of SES in studies of developing countries related to fertility and child health. To obtain a comprehensive perspective on current uses in this area, we selected the main demography journals, as well as the top journals of sociology and other related disciplines.⁴ Then, we searched the citation database of the Institute for Scientific Information for articles in the selected journals that contained the word *fertility*, *contraceptive use*, *contraceptive choice*, *infant health*, *child health*, *infant mortality*, or *child mortality* in their title, abstract, or list of keywords. From this list of articles, we conducted cursory reviews and selected all of the articles that met our criteria. We focused on only articles that included multivariate analyses at the microlevel for developing countries. Our exclusion of qualitative analyses means that we are unable to comment on an important body of literature. However, we decided early on that including such articles would introduce a much higher degree of subjectivity into our categorization process. Our review covered articles between 1990-1998. Our search generated a

⁴ The journals included *Demography*, *Population Studies*, *Population and Development Review*, *American Sociological Review*, *American Journal of Sociology*, *Social Forces*, *Journal of Political*

total of 69 articles that met our selection criteria. There were two articles that did not include a conceptual discussion of SES or any measures related to SES in their models, so our discussion below is based on 67 articles.

To reflect the split in the theoretical literature between a component and unitary conceptualization of SES or class, we first classified articles according to their conceptual approach along those lines.⁵ The component approach was characterized by explicit hypotheses stated about the distinct ways in which the components of SES would affect the outcomes of interest. Articles that employed a unitary approach hypothesized about the effects of their various measures of SES in terms of a general notion of SES. We found that several articles could not be classified as conceptually unitary or component either because there was a lack of discussion or because the discussion was ambiguous. Rather than force an interpretation on the conceptual approach of these articles, we created another category, “ambiguous.”

We also classified each article according to whether SES was measured with one variable or more than one variable in the empirical models. For this we included variables that were related to education, income, consumption, wealth, assets, dwelling characteristics, occupation, and class. Some of these variables have potential roles in fertility and child health outcomes in addition to a socioeconomic role and authors did not always discuss all of them as explicitly socioeconomic. Therefore, to maintain consistency in the variables that were recorded across the studies, we included the variables that we considered to reflect SES, rather than relying on the

Economy, American Economic Review, Econometrica, American Journal of Public Health, and Social Science and Medicine.

⁵ Two of us coded the articles. Initially both coded the same set of subset of articles and then we compared our assessments to insure consistency in our coding. We found that we were not in disagreement about any of the articles that we coded, but there were some that neither of us could place initially. These articles were then discussed by all three authors to insure that they were placed correctly.

authors' classifications. We anticipated that a unitary conceptualization implies the use of a single measure for SES. This might be a single measure such as income or education or it might be an index that combines variables that others would consider to capture different dimensions. Further, we expected multiple variables to be used when a component conceptualization was held by the authors. This did not always turn out to be the case. The number of articles that fell into each category can be seen in Table 1. Below Table 1 we describe each cell in greater detail, discussing typical articles within each cell.

Table 1: Summary of Conceptual and Empirical Approaches

	<u>Conceptual Approach</u>		
	Unitary	Component	Ambiguous
Single Measure	0	5	9
Multiple Measure	6	37	9

Unitary conceptually, single measure: Surprisingly, there were no articles that fit into this category.

Unitary conceptually, multiple measures: The six articles within this category expressed a global conception of SES but used more than one measure to capture its effects. Several articles within this category investigated a key SES variable in an effort to establish if its effect on fertility or child health was due to a unitary SES, or if it had a separate effect. For example, Sandiford, Cassel, Montenegro, and Sanchez (1995) and Desai and Alva (1998) seek to establish whether maternal education has an effect on child health above and beyond its association with

socioeconomic status.⁶ Sandiford et al. (1995) ask, "...if statistical control by imperfectly measured socio-economic status removes about half the apparent advantage of education, how much would be left if it were perfectly measured?" (p. 6). Their research context was unique in that they were able to take advantage of an adult literacy program in Nicaragua, which they argued allowed them to completely disentangle maternal literacy from SES without concern for measurement error. By grouping the women in their sample according to whether they were illiterate, educated by traditional means, or literate by the adult literacy program and including several measures of SES as controls, they claim to distill the separate effect of maternal literacy. In their analysis, literacy did have positive consequences for child health. In contrast, DeSai and Alva (1998) reach different conclusions regarding the role of maternal education in their analysis of DHS data from 22 countries. They conclude that the separate maternal education component operates as a proxy for SES or unobserved background factors and that its effect is diminished once SES control variables are introduced and is greatly diminished with a fixed-effects model. DasGupta (1997) offers some parallel results from the Punjab. Her article examines the relationship between child mortality and household SES and income. She finds that income plays no role once other SES factors are included in her model. In her words, the results, "...suggest that familial risk is affected by household care practices, and by socio-economic status rather than by income level alone" (p. 199).

Conceptually component, single measure: Articles in this category were explicit about a conceptualization of SES that allowed different components to have distinct impacts. However, they only included one measure related to SES in their analyses. In most of the articles in this category maternal education was the component of SES featured by the authors, apparently

⁶ The fact that there are several hypotheses for the effect of maternal education on child health that are

because the authors considered it to be the most important or only important component of SES in the context of their analyses. For instance, Defo (1996) reviews the findings on maternal education and argues that it is the most important status variable. In the remaining article from this category, the author explained that education was the only measure available and thus had to suffice as a proxy for other components as well. "...women's employment and the socioeconomic level of the household could not be included in the analysis because they were measured at the time of survey not at the time of pregnancy. Education is included in the model as a proxy for SES and as a measure of the awareness of the value of prenatal care" (Gage, 1998: 25).

Component conceptually, multiple measures: This category was clearly the dominant category and included more than half of the articles in our review. We placed articles in this category if they contained an explicitly stated hypothesis about at least one component, and they used multiple measures of SES. Wood and Lovell (1992) investigate racial inequality in Brazil and determine that race remains an important factor in explaining mortality differences even after controlling for SES differences. To control for SES, they include a measure of monthly household income but they also note that, "...income alone does not adequately control for socioeconomic status..." (p. 713). Therefore, they also introduce controls for the education of both parents and indicate the specific channels through which each of these variables may affect child mortality. In another example, Bankole (1995) includes measures of wife's education and husband's occupation in his analysis of the effects of fertility desires of marital partners in Nigeria on their subsequent fertility. He does not include husband's education and wife's occupation due to their collinearity with wife's education and husband's occupation respectively.

not explicitly tied to SES created some difficulty in the classification.

That wife's education and husband's occupation are not considered to be collinear indicates a conceptualization of education and occupation as separate dimensions of SES. In yet another example, DeGraff, Bilsborrow, and Guilkey (1991) explore community and individual level determinants of contraceptive use in the Philippines. They find strong support for the importance of community level effects on the decision to use modern contraception. In addition to a wide variety of community level SES variables, they include individual and household level variables such as wife's education, husband's occupation, as well as husband's education and the value of their land, both of which are assumed to proxy for permanent income. Their specification of the separate effects of each of these variables clearly points to a component approach. The approach of these articles is typical of the many articles within this cell. Nevertheless, there is substantial variation in the actual SES components that are used, and we examine this issue in more detail below.

Ambiguous: There were eighteen articles that contained little or no discussion of their conceptualization of SES or the reasoning underlying their measures. It is important to note that the objectives of many of the articles in our review, particularly several in this category, did not include an interest in the effects of SES on the fertility or child health outcome being studied. Often SES variables were used as controls, and in fairness one would not expect an extensive discussion of SES in these articles. In one example Curtis, Diamond, and McDonald (1993) examine demographic and familial effects on post-neonatal mortality in Brazil. They explain their use of maternal education "...as a general control for SES and for knowledge of health-related matters" (p. 36). We could not infer if this reflected a unitary conceptualization or if it simply meant that education was used as a proxy for SES because of its correlation with other dimensions of SES. Other articles in this category did contain some discussion of their SES

measures, but they were ambiguous about their conceptualizations, sometimes making statements that indicated a unitary approach and at other times a component perspective. For example, Razzaque, Alam, Wai, and Foster (1990) only include an indicator for wealth (an index of consumer durables) in their examination of the effects of famine on neonatal and postnatal mortality in Bangladesh. In some places in the article they refer to this as “economic status” while in other places they refer to it as “socioeconomic status.” It was impossible to place these ambiguous articles in either the unitary or component categories.

Measures of SES Used in the Studies

In addition to considering the conceptual approaches and how they relate to the empirical strategies of the articles, we examined the actual measures in the analyses. We found that there is little consensus on the issues of which components of SES should be included and how they should be measured, outside of the widespread agreement that maternal education should be incorporated. Table 2 lists the number of articles in which the main variables appeared. The variables listed in Table 2 represent broad categories within which was a good deal of variation across the studies. Initially, we compiled a detailed list of all the different ways in which each of these variables was measured. This list was too vast to represent in the table, but we describe some of the various ways in which each was measured and the meanings which authors assigned to them below.

Table 2: Frequencies of SES Variables Appearing in the Studies

Variable	Frequency
Female/maternal education or literacy	66
Assets and/or housing quality	35
Husband/paternal education or literacy	23
Husband/paternal occupation	15
Female/maternal occupation	13
Income or consumption	11
Pays social security (indicator of access to health care)	1
Received remittances	1
High caste household	1

Clearly, maternal education is the most frequently used socioeconomic variable in these studies. It was included in every study for which SES was incorporated in the empirical analyses except one. In contrast, husband's or paternal education was included in only about a third of the articles. Education was sometimes measured in years, but more commonly measured as a series of dichotomous variables indicating salient cutoffs for the educational system of the particular country being studied. The hypothesized role of maternal education in the outcome of interest also differed. For Gage (1998) maternal education is a proxy for SES, but maternal education has also been hypothesized to enhance child health by producing changes in individual behavior such as utilization of modern health services and a host of other health-related behaviors (DeSai and Alva, 1998; Defo, 1996). It also improves women's status, which can have consequences both for child health and fertility and contraception (Balk, 1994). When included, paternal or husband's education is usually taken as a more straightforward representation of SES. For example, in a study of the fertility decline of Iran, Raftery Lewis, and Aghajanian (1995) find that the decline was greater for women whose husbands were more educated (controlling for wives' education). They attribute this to husband's education being a "reliable proxy for husband's occupational status and hence the socioeconomic status of the household" (p. 177).

Over half of the studies employed a measure of assets and/or housing quality. In this category we included any indicator of housing quality, landholdings, and assets, both consumer durables and agricultural, and as such it is the most diverse category. However, the researchers' measurement strategies also contributed quite a bit to the heterogeneity in this category. The asset or housing characteristics considered varied substantially across studies. Some authors combined several characteristics into an index while others entered one or more as single variables. More rarely, the total value of household assets was used (e.g., Dargent-Molina, James, Strpoatz, and Savitz 1994). Often, this type of variable is taken to represent wealth or used as a proxy for permanent income. Common variables within this category, however, are not strictly socioeconomic. Access to sanitary drinking water and toilet facilities has an effect on child health that exceeds its association with SES. One difficulty is that these types of variables are often included in composite measures of assets and housing quality.

The use of assets as an indicator of economic status is a noteworthy difference in how researchers measure SES in developing countries compared with measures in developed countries. Income measures are used less frequently which at least partially reflects the difficulty of obtaining accurate income data. It also reflects the widespread use of DHS surveys, which collect asset and housing quality information but no information on income or consumption. Consumption as measured by total household expenditures was used in only one study.

In comparison to other aspects of SES, occupation is included relatively infrequently, with maternal and paternal occupation being used about equally as often as one another. For males occupation was generally coded into two or more occupational groups. The groups differed among studies, but a distinction between agricultural work and non-agricultural work was prevalent. Hirschman and Guest (1990), who classify husband's occupation into agriculture,

production, sales/service, clerical, professional/administrative, and other, suggest that husband's occupation can be taken as a "crude measure of social class" (p. 374). However, generally when occupation is included authors do not refer to it as a measure of class. More rarely authors made a distinction between working in agricultural for oneself and working for wages which could be viewed as an indicator of class position. For women the same types of occupational categories were used, but an indicator of female employment outside of the home was also occasionally used.

The combinations of variables used across studies are also interesting. A table describing all combinations we found would be quite long since there were many unique combinations. Table 3 summarizes the combinations that appeared three or more times. Fourteen other combinations were used once or twice. Probably the most remarkable observation that emerges is the amount of heterogeneity in which sets of variables researchers include in their analyses. At a general level we see that a measure of education alone or in combination with some type of measure of economic resources is the most typical.

Table 3: Frequencies of Combinations of SES Variables

SES Variable Combinations	Frequency
Female/maternal education	13
Female/maternal education, assets	8
Female/maternal education, husband/paternal education, assets	7
Female/maternal education, income	5
Female/maternal education, assets, husband/paternal occupation	5
Female/maternal education, husband/paternal education	4
Female/maternal education, female/maternal occupation	3
Female/maternal education, husband/paternal education, assets, husband/paternal occupation	3
Female/maternal education, husband/paternal education, assets, female/maternal occupation	3

Aggregate Measures of SES

Our review focuses on micro-level SES variables, but the increasing use of aggregate level variables in micro-level analyses requires us to briefly discuss their role. Of the 67 articles we reviewed, 36 included at least one aggregate-level indicator of SES. Although, this is only slightly over half of the studies in our review, this is an especially large proportion given that community indicators would not be relevant for all these studies since many of them are confined to a particular village or city. The increased interest in aggregate-level measures is partly due to recognition of the importance of contextual effects on individual behavior as well as the development of statistical techniques, such as multi-level modeling, which allow these analyses. However, as aggregate variables and multi-level methods provide fresh insights, their conceptualizations, particularly with respect to SES factors, is often ambiguous.

We found several common approaches for inclusion of aggregate variables in micro-level behavioral analyses. One widespread approach is to include variables that are indicators of residential location such as urban/rural or region. Twenty-seven of the articles in our review included an indicator of urban/rural residence and 10 included an indicator of region. Place of residence is often seen as a proxy for living conditions or SES. Another common approach is to use community infrastructure information, such as availability of elementary school or health facilities within a neighborhood or village. In a third approach the researcher aggregates individual or household-level variables at a higher level. This is typically done when it is desirable to assess the effects of community-level variables but aggregate-level information is unavailable. For example, instead of including a dummy variable to indicate whether each household in the sample owns a television, a variable may be included which indicates the percent of households within a neighborhood or village that own a television. The advantages of

including the variable at the community rather than the individual level may be conceptual since it is believed that television access or family planning accessibility will have a common effect on individuals or households. Also, some empirical approaches such as fixed-effects models require variables at the aggregate level.

The relationship between SES and class variables on the individual and aggregate levels is complex, and researchers in this area attribute several different, yet interrelated, roles to aggregate socioeconomic variables. One role relates to the use of aggregate information as a proxy variable for SES, but at a community level. A number of articles suggested that urban households were better off than rural households, for example, and used this as an explanation of their findings. An important question is whether urban residence is merely a proxy for individual-level differences in status, or if it also captures an effect of community characteristics. In other words, will the consistently observed rural/urban differential in child health be eliminated with adequate controls for household SES? The evidence on this has been mixed (Sastry, 1997). In a study of child mortality in Brazil, Sastry (1997) finds that specific community infrastructural factors play important roles in child mortality above and beyond the effect of household SES. In addition, Desai and Alva (1998) use a fixed-effects model to control for unobserved community-level factors and find that this greatly diminishes the effect of maternal education on child health.

A related function of aggregate variables is to shape the effects of SES variables measured at the individual level. A number of studies emphasized that the effects of individual-level SES indicators varied by the socioeconomic context of the community. In a recent study based on data from Ecuadorean Amazon, Lobao and Brown (1998) show that the effect of individual SES factors on fertility is greatly moderated by the existing development context and

class structure. Dargent-Molina et al. (1994) examine how the effect of maternal education on infant diarrhea in the Philippines differs between advantaged and disadvantaged communities. Durkin, Islam, Hasan, and Zaman (1994) find that different SES measures are statistically significant in their four research populations, rural and urban Bangladesh and rural and urban Pakistan. The finding that various socioeconomic components operate differently in different contexts leads them to suggest the inclusion of a wide range of SES measures in studies of child health in developing countries. Residential information is a particularly important dimension and may alter the role of individual-level SES variables. However, many authors do not attempt to disentangle the separate effects of residence as a community proxy for SES and residence capturing other factors.

In summary, it is difficult to categorize the use of aggregate variables from our review of the literature. However, we do find that residential information is the most likely to be used, followed by information on community infrastructure. Some authors may use these aggregate indicators to control for community-level differences, including SES. Or, they may be part of an argument that the effect of SES variables depend on the context and are moderated by aggregate variables.

Summary of Literature Review Findings

Several things stand out from our review of these articles. First, our findings highlight important gaps between the conceptual treatments and empirical implementations of SES and class. Despite the prominence of the unitary conceptual framework in the theoretical literature, a large majority of the empirical studies use a component perspective. The implicit assumption in the empirical implementation is that the component approach has won the debate. Explicit

testing of a unitary versus component construct of SES is rare in this empirical work (see Durkin, et al., 1994 for an exception). On a related note, we found that the concept of class was very rarely used. We were also surprised by the number of studies that were ambiguous about their conceptualizations of SES. This same characterization holds for the aggregate measures.

Another observation is the centrality of maternal education in these analyses. It was included in all the studies that incorporated SES but one. When a single measure of SES or class is used it is almost invariably maternal education. (One study, Razzaque et al. [1990] used only an assets measure instead.) And several of the studies focused on the importance of maternal education in comparison with other SES variables or as a reflection of SES. But there have been conflicting results across these studies and the exact role of maternal education in health and fertility outcomes is not fully understood.

Finally, it is clear that data availability influence the ways in which SES can be measured. In some cases this can account for the inconsistency between conceptualization and measurement that we found in some studies. Collecting socioeconomic data is costly, so often surveys do not include information on all of its components. The absence of consumption measures in the studies in this analysis is surprising in light of their theoretical relevance as measures of permanent income. The widespread use of DHS surveys accounts for a large number of the studies that employed indexes of assets and housing quality. Eighteen of the studies in our literature review used one or more DHS surveys, and 2 used a World Fertility Study, the predecessor to DHS. There are data sets that do collect income and extensive consumption data, such as the World Bank's Living Standards Measurement Studies (LSMS) which are available in several developing countries and Rand's Family Life Surveys (FLS) which are available in four developing countries. Surprisingly none of the studies in our analysis used a LSMS data set, and

only three used an FLS data set. More effort should be directed at developing surveys that reflect conceptual meanings and empirical investigations of the degree to which widely available measures reflect these meanings of SES.

METHODOLOGICAL ISSUES IN USING SES/CLASS

The literature review highlighted several methodological issues that arise in incorporating SES or class in analyses of fertility and child health outcomes. In this section we crystallize these issues in the abstract, but our analysis is driven by the concrete literature that makes up our review. One of the fundamental distinctions that organizes this section is that of whether a researcher conceptualizes SES or class as unitary or as components. We treat the methodological issues surrounding the unitary concept first and then turn to the components.

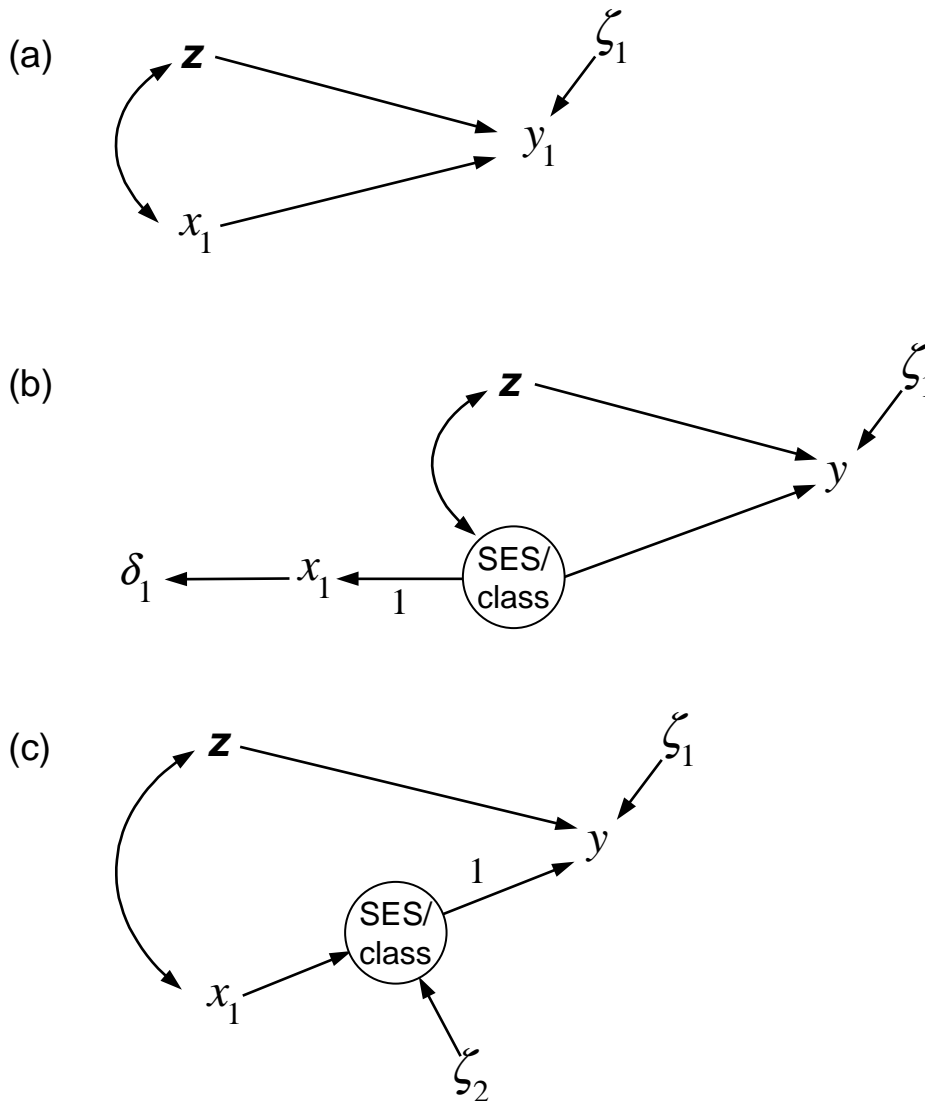
Unitary Concept

Our literature review revealed that only a minority of the empirical studies treats SES or class as a single dimension. However, given that some do and given the strong theoretical traditions in sociology that do, it is important to consider the treatment of such unitary concepts. At the operational level there are two aspects to consider. One is whether the researcher measures the unitary concept with a single or with multiple indicators. A second aspect is whether the measures are *causal* or *effect* indicators. This latter distinction describes the relation of the latent concept to the measures. Causal indicators are measures that have a direct influence on the latent variable to which they are tied. Effect indicators are measures that are directly affected by the latent variable.

Some notation will facilitate our discussion. We refer to the fertility or child health outcomes by y , the SES or class measures by x_1, x_2, \dots, x_q , and all the other substantive determinants of y by \mathbf{z} . The ζ_1 is the disturbance for y and it is uncorrelated with all explanatory variables and has a mean of zero. Figure 1a illustrates the case where SES or class is a unitary concept that we measure with a single variable, x_1 , that is correlated with the other variables contained in \mathbf{z} . The SES or class variable, x_1 , could be an index or a single critical measure. For example, child health might be the outcome variable (y), maternal education might be our only measure of SES (x_1), and \mathbf{z} might be composed of other individual characteristics such as maternal age, marital status, etc. and community characteristics such as urban/rural residence and proximity to health clinics. Regardless of its make-up an implicit assumption in such a structure is that the x_1 variable is free or nearly free of any random or systematic measurement error. That is, we are assuming that the measure is a perfect representation of SES or class.

Stated so boldly the plausibility of this assumption will be doubted by most readers. If we do not treat x_1 as a perfect measure of SES, then we must distinguish whether x_1 is a causal or effect indicator of the latent variable SES or class. Figures 1b and c illustrate these two cases. In Figure 1b x_1 is an effect indicator of the latent SES or class variable. The δ_1 is the error of measurement in x_1 . So in the above example, maternal education reflects the SES concept plus random measurement error. The major obstacle to estimating such a model is that without further information, it is not identified, and therefore it will not be possible to find unique values for the effects.⁷ One solution would be to have knowledge of the measurement error variance that could be incorporated into the estimation. This is frequently not available. Another possibility is to use multiple indicators of SES or class. We will consider this possibility shortly.

Figure 1 Unidimensional, Single Indicator Models of SES/Class



But suppose that Figure 1b is the true model, yet we follow typical practice and ignore measurement error in the SES or class measure and estimate an incorrect model that looks like Figure 1a. In our example, this would mean that we would treat maternal education as a perfect representation of SES. As is well known, both our estimates of SES or class's impact on y and those of any elements of \mathbf{z} that are correlated with x_1 will be biased (Theil, 1957). This means

⁷ For a discussion of identification of these models see Chapter 7 in Bollen (1989).

that even if SES or class is a “control” variable, it can frustrate attempts to get a consistent estimator of the other variables’ effects that are of more central concern.

Suppose now that Figure 1c is correct with x_j being a causal indicator. In this case maternal education would still be an indicator of SES, but it influences SES rather than SES influencing it. Here too we have an identification problem. Without knowing the error variance of ζ_2 for the latent SES or class variable, the model as a whole is underidentified. But, the consequences of estimating Figure 1a when Figure 1c is true, are different than what we found when Figure 1b was the true model. More specifically, the coefficient for the x_j variable in the analysis of Figure 1a is a consistent estimator of the impact of SES or class on y , the fertility or child health outcome (see Bollen and Davis, 1993). We need to qualify this by saying that the model assumes that x_j directly affects SES or class and that x_j is not a proxy or error-containing measure of some other construct. Furthermore, this model assumes that x_j is the only causal indicator of SES. If these conditions hold, then surprisingly we get a consistent estimator of the effect of the latent SES or class variable on y using x_j instead of the latent variable, and coefficients for the elements in \mathbf{z} will not be biased (Bollen and Davis, 1993).

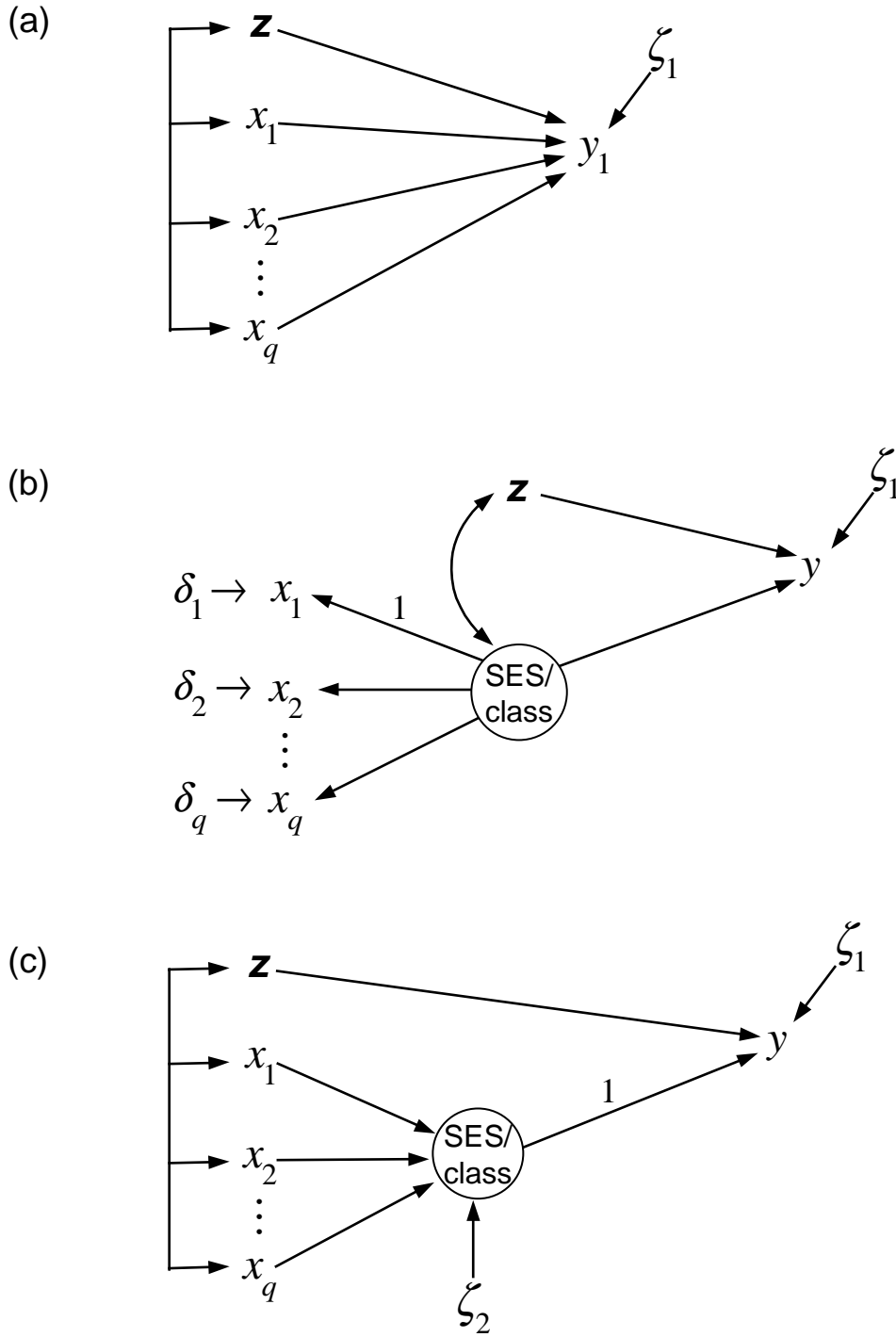
Maintaining the unitary concept view of SES or class, we now move to the case where multiple measures are available. Figure 2a is a path diagram that represents the model where each of the SES or class measures (x_1, x_2, \dots, x_q) enter separately. This corresponds to the few studies we discussed where a unitary concept was accompanied by multiple measures as individual SES variables in an equation. Returning to our earlier example, suppose maternal education was accompanied by household income and husband’s occupation as additional SES indicators. This approach raises some complications. First, if SES or class is unidimensional, then the rationale for including several separate explanatory variables to measure it is hard to understand. If each is a

perfect measure of SES or class then the measures should be perfectly correlated. If each is a nearly perfect measure, then near perfect collinearity between these variables will follow (Gordon, 1968). One way to resolve this issue is to acknowledge that measurement error is present and to view the SES or class measures (x_1, x_2, \dots, x_q) not as distinct variables but as a collection of effect indicators, each partially reflecting the unitary SES or class concept. Figure 2b captures these relations. Here the latent SES or class variable is in an oval. It underlies all of the measures (x_1, x_2, \dots, x_q) and it also affects the fertility or child health outcomes (y) . For our hypothetical example, maternal education, household income, and husband's occupation would be the x variables reflecting the latent SES variable. This model is identical to the one represented in Figure 1b except that now we have multiple indicators whereas before we had a single measure. The multiple indicators are sufficient to overcome the identification problems that we faced with a single measure. Therefore we can have a consistent estimator of all of the parameters in the model in Figure 2b

What happens if Figure 2b is true but we estimate the model in Figure 2a instead?

Unfortunately, inconsistent coefficient estimators of the SES or class effect as well as the effects of the variables in \mathbf{z} are the likely result. The reason is that such a model includes a number of imperfect indicators of the same concept. As in the case of estimating the model in Figure 1a when the model in Figure 1b is correct, ignoring measurement error can result in inconsistent coefficient estimators for SES and the elements in \mathbf{z} , including any aggregate measures that might be a part of it. To make matters worse, the SES or class part that is common to them could create collinearity problems. In brief, if Figure 2b is the true model, estimating Figure 2a is a bad choice.

Figure 2 Unidimensional, Multiple Indicator Models for SES/Class



Suppose that the indicators x_1, x_2, \dots, x_q are causal indicators of the unitary SES or class concept. In this case we have the model in Figure 2c. The model matches that in Figure 1c except that now we have multiple causal indicators while before we had a single one. A good case could be made that maternal education, household income, and husband's occupation are causal indicators for SES. Another example is to treat education and occupation as causal indicators of permanent income. Unfortunately, the additional causal indicators do not help to identify the model and more specifically the error variances of ζ_1 and ζ_2 remain unidentified. Though if we use the model in Figure 2a in place of the model in Figure 2c, we can estimate the coefficients of the latter model consistently (Bollen and Davis, 1993). This implies that we can separately enter multiple indicators of a unitary SES or class variable as explanatory variables, if these are causal indicators and the model corresponds to Figure 2c. As we saw above, with multiple effect indicators and a model that corresponds to Figure 2b, we will not have a consistent estimator of effects if we estimate a model like Figure 2a. So whether the indicators are causal or effect indicators matters. This points to the importance of reflecting on the nature of the indicators (Edwards and Bagozzi, 1999).

Component Concepts

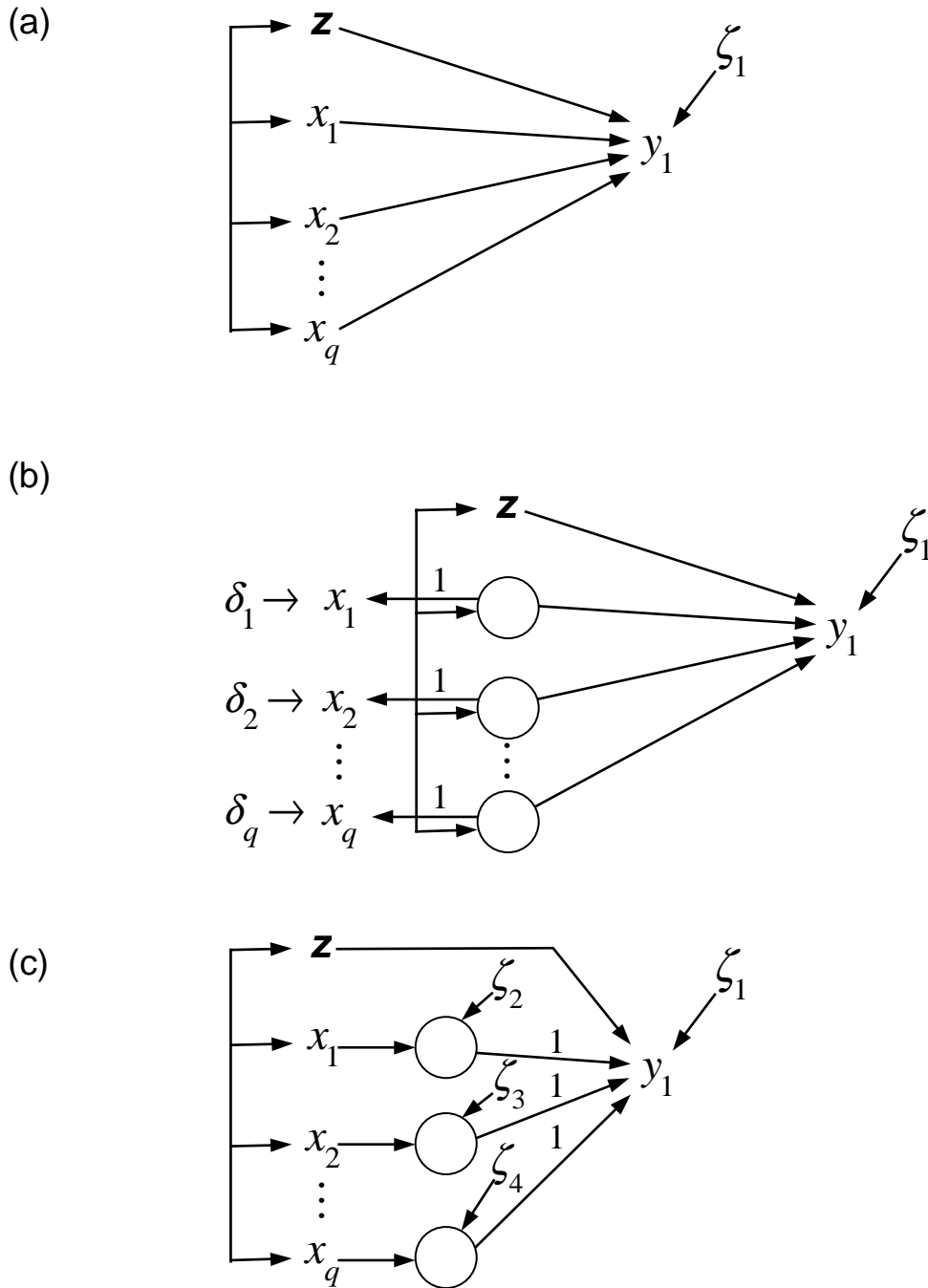
The premise of the discussion in the previous section was that SES or class was a unitary concept. A far more common assumption in the literature that we reviewed was that SES or class is composed of distinct components, each capable of exerting separate effects on fertility or child health. In this section we examine the issues that emerge under the component conceptualization of SES or class. As in the prior section it is useful to draw a distinction between the number of

SES or class variables used, the allowance for measurement error or not, and if there is error, whether there are causal or effect indicators.

Our starting point is the most typical model type that treats SES or class as several components and single variables represent each component. Figure 3a is the path diagram that corresponds to this situation. In it x_1, x_2, \dots, x_q are the components of SES or class measured without error and they affect the fertility or child health outcome. Interestingly, this path diagram matches Figure 2a in which there were multiple measures of a unitary concept of SES or class. The distinction is more analytical than a difference in diagrams. Here we are assuming that each SES or class variable represents a different component whereas in the previous case we assumed that SES or class was a unitary concept but the researcher employed multiple measures of it.

In contrast with our example in the above unitary section, we now assume that maternal education, household income, and husband's occupation are separate components with distinct effects on child health. Suppose that a researcher holds a component concept of SES but uses only maternal education. This implies that Figure 3a is the true model, but that the researcher estimated the model in Figure 1a. A classic case of omitted variable bias would accompany this strategy (Theil, 1957). If x_1 is the included SES or class variable, its estimated effect would be contaminated by the omission of the x_2, \dots, x_q variables. Furthermore, the remaining determinants that compose \mathbf{z} also would generally have biased and inconsistent coefficient estimators. The direction of bias would be difficult if not impossible to say without additional information about the impact of the omitted variables on y and the relation between the omitted and included explanatory variables.

Figure 3 Multidimensional, Multiple Indicators for SES/Class



Measurement error adds another layer of complexity. Consider first the case where we properly include measures of all components of SES or class, but each is an effect indicator of its

respective component and contains random measurement error. Figure 3b is the path diagram that captures these relations where the ovals are the latent SES or class components and the x 's are their corresponding measures. In our example measures for maternal education, household income, and husband's occupation would not be perfect measures of the underlying three latent components. This is quite likely since both domestic as well as international studies have documented the measurement error in seemingly straightforward variables such as health and education (Bielby, Hauser and Featherman, 1977; Strauss and Thomas, 1996). If we ignore the measurement error in the x 's and estimate a model that looks like Figure 3a when Figure 3b is true, then inconsistent estimators is the likely result where the direction of bias would be difficult to determine. Recognition of the measurement error in the x 's would only help if we knew its magnitude so that we could incorporate it into the estimation. Alternatively, we could vary the levels of measurement error variance to perform a type of sensitivity analysis (see Bollen, 1989: Ch. 5).

Staying with the presence of measurement error in our SES or class variables, we move to the case where the measures are causal indicators of their respective latent component variables. Figure 3c is a path diagram of this situation. In a situation that is analogous to Figures 1c and 2c, the model is not identified because unique values for the variances of the ζ 's are unavailable. But remarkably, if we estimate the model in Figure 3a when Figure 3c is true, we will get consistent estimator of the regression coefficients.

Section Summary

The methodological problems in treating SES or class in studies of fertility or child health critically depend on whether (1) SES or class is unitary or has multiple components; (2) we have

single or multiple measures; (3) variables contain measurement error or not; and (4) the presence of causal or effect indicators. Upon consideration of these methodological issues the news is mixed.

On a positive note, in some of the cases we have described failure to account for measurement error will not result in substantial problems. That is, in correctly specified models that have latent variables constructed by causal indicators, estimates of the coefficients for explanatory variables will be consistent even if the models are estimated without allowing measurement error. In contrast, this is not the case if the true model requires effect indicators. However, theory should guide decisions on the treatment of indicators as effect or causal.

Another positive conclusion is that sometimes we will be able to empirically distinguish between different models. For instance, a test of whether the coefficients of x_2, \dots, x_q are nonzero can distinguish the unitary concept and single measure case in Figure 1a from the component multiple variable SES or class model of Figure 3a. Yet in other cases we will not be able to differentiate models. An illustration is that the model in Figure 3a cannot be distinguished from the component model with causal indicators in Figure 3c or the unitary SES or class model in Figure 2c. This is an interesting case because the model in Figure 3a is a common one in the studies that we reviewed. This situation could be overcome by introducing additional dependent variables into the model. If, for instance, we had a second y variable that was directly influenced by SES or class but not the x 's, we could form a MIMIC type model (e.g., Hauser and Goldberger, 1971). The unitary concept MIMIC model would imply proportionality constraints that would not be implied by the multi-component SES or class construct so we could compare structures. Thus, the plausibility of SES as a unitary construct can be evaluated empirically (Hauser and Carr, 1995).

In actuality, the situation is not necessarily as simple as what we have depicted. It is possible to have a model that combines the various scenarios we have described. For example, some of the SES components could have effect indicators, others could have causal indicators, and others could be measured relatively free of measurement error. The same consequences occur however in that failing to take measurement error into account in situations where the true model contains effect indicators or omitting a component can result in biased estimates. By formalizing these models we have been able to clarify important issues that arise in the treatment of SES. More attention should be devoted to evaluating the ways in which SES is empirically implemented. But interplay between theory and empirical analysis is also warranted.

Conclusions

From a sociological perspective social class and socioeconomic status determine life chances. Prime representations of life chances are control over child mortality and control of fertility. Our literature review concentrated on the impact of SES or class on these variables in the context of micro, quantitative analyses in developing countries. Our framework organized studies according to whether they had a unitary, component, or ambiguous conceptualization of SES or class and whether they used single or multiple measures of these constructs. The pairing of a component concept of SES with multiple measures is the most common study type in our review. Though this is not surprising, it is surprising to find that in a significant proportion of studies we cannot tell whether the authors hold a unidimensional or multidimensional conception of SES. In addition, we did not expect to find, but did find, works that have component SES concepts but rely on a single measure to capture all components. We also did not expect the absence of papers that had a unidimensional concept for SES or class and a single measure or

index for it. Overall, there was greater inconsistency in the dimensionality of concepts and the number of measures than what we expected. Furthermore, with the exception of maternal education, there was considerable diversity in the measures of SES in these works. So the literature has far from reached a consensus on either the definition or the measurement of SES or class.

As with the SES/class variables at the micro level, we found substantial ambiguity about the purpose for using the residential indicators and other aggregate variables. Authors sometimes included residential indicators to control for SES at the community level. Alternatively, many studies tested whether the community level moderates the effect of SES variables at the micro level. We expect that recognition of the importance of contextual factors and increasing availability of methods such as multi-level models will greatly increase the importance of clarity as researchers seek to incorporate aggregate level variables in their traditional analyses.

One of the most glaring gaps we discovered is between the theoretical literature on class or SES and the manner in which these concepts appear in empirical work. Particularly striking is the absence of direct reference to measures of class. It is not infrequent to see social science arguments discuss the working class, middle class, landowning class, etc. as key players in societal development or as class positions that determine individual behavior. Yet the concept of class barely is mentioned in these papers and instead many focus on the components of SES. One line of research that could bear fruit is to construct child health and fertility studies models that include variables to measure class, or the relation to the means of production. We mentioned Wright's (1985; 1997) approach to defining class. Including measures that capture this and other definitions of class in surveys and seeing how these perform compared to the typical SES ones would help to address this neglect. Miech and Hauser (1998) have investigated this issue with a

Wisconsin data set, but we are unaware of research that addresses this issue for developing countries. Limited work on class is possible with the DHS and LSMS surveys. Some of the questions on these surveys provide information on the relation of the individual or the household to the means of production. These variables could be used to construct measures of class. A comparison of such measures to the more typical SES measures could reveal whether class has justifiably been ignored in these works or not. If SES has superior performance to class, then it will raise serious questions about the meaningfulness of sociological arguments suggesting an impact of class membership on individual behavior. Alternatively, if class has greater explanatory power than SES, we will need to reevaluate the effects that we have typically attributed to SES. So a high priority item should be to do serious empirical comparisons of class vs. SES impacts on child health and fertility. Furthermore, if the results for class look promising, this would argue for developing better survey measures of class.

An alternative to seeing SES and class as competing concepts is to better integrate them. One idea is to view class in the Marxian sense as the source of the other components of stratification. From this perspective educational attainment, occupational prestige, income, and power have a common origin in class. Whether these specific parts mediate all of class's impact on other outcomes like health and fertility is unknown. Furthermore, these specific components that derive from class could merge to form the SES construct. So the sequence of effects would be that class gives rise to individuals' education, occupation, income, and other specific aspects of stratification and these components would lead to the overall SES and then SES would affect child health and fertility. To complete the cycle we could consider SES as partially determining later class position. Another alternative is to treat class as another component of SES. From this perspective class would compete with the other components of SES in affecting behavior.

Both sociologists and economists may also do well to look beyond the domains of their own disciplines. Economists, for example, have focused enormous efforts on measuring and evaluating permanent income. While permanent income has received attention by some sociologists (see Hauser and Warren, 1997 for example), it has not received the attention it deserves within sociology. There are some particularly intriguing parallels between permanent income and class. In a similar fashion, those economists interested in permanent income might benefit from examining the sociological literature on class.

Permanent income and class are both very general concepts. Moving in the opposite direction, the economic literature has moved toward disaggregating the various components of income, which may have quite different behavioral implications. Thus, combining all income sources into a total income measure and using this single measure in their empirical analysis may not be the most fruitful approach within a scenario of component explanatory variables. Sociologists might benefit from differentiating the components of income and to include multiple sources when appropriate.

Another challenge to researchers is to determine the dimensionality of SES or class. Does each act as a single dimension or is each made up of sub-parts that have distinct influences? A closely related issue is how best to measure SES or class and to specify the relation between the indicator variables and the constructs. Some of these issues were illustrated in the methodological section. The statistical technology that would enable us to address these and other questions exists so this is not an obstacle to their investigation.

A response to the call for an examination of the unidimensionality of SES or class might be that this issue has already been resolved. For instance, Hauser (1972) demonstrated that variables such as parent's income, education, and occupational prestige have separate effects on

status attainment, and Hodge (1970) showed that different components of SES have different effects on various social and political integration indicators. However, the behavior of these variables could depend on the outcome and we are unaware of explicit tests in the context of child health and fertility. The closest we are aware of in this area is work by Behrman and Wolfe (1987) who examine whether maternal education has a direct effect on child health or whether “family background” variables can explain the typical maternal education effect. Their results are consistent with a unidimensional SES background type of effect. Furthermore, most of the attention in this area has been to SES to the neglect of class. Even if SES is best thought of as a collection of components, this does not address the standing of class as a unidimensional or multidimensional concept.

Our focus in this review has been the relation of SES and class to child health and fertility in developing countries. But many of our findings and recommendations for the study of SES and class extend beyond these outcomes and to research in developed as well as developing countries. Domestic stratification research shows some promising signs, but our impression is that many of our findings on the treatment of SES and class would hold for most such studies. Given the centrality of SES and class, we would all benefit from further attempts to answer the questions posed in our review.

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