

COMMENTARY

Socioeconomic inequality in birth outcomes: What do the indicators tell us, and where do we find the data?

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All human beings are born free and equal in dignity and rights. — Universal Declaration of Human Rights¹

We all know the first words in Article 1 in the United Nation's Declaration of Human Rights. We also know, however, that this is more a declaration of intent than of reality, even in the most privileged societies.

Socioeconomic equity in birth outcomes ought to be an important goal for public health policy, not only because birth outcomes are important in their own right, but also because health in early life affects health later in life. The life-course approach to chronic disease has pinpointed intrauterine and early life influences in the occurrence of several diseases of public health significance;^{2,3} for example, the social patterns associated with birth weight may be important contributors to social inequalities in adult disease.⁴ The life-course perspective is not new: in 1945 Dugald Baird found the quality of a mother's environment from birth to maturity to have a strong influence on her capacity to bear healthy children, and he attributed the high prevalence of stillbirth and premature labour in groups with a low socioeconomic status (SES) to poor maternal nutrition.⁵

To monitor socioeconomic inequality in birth outcomes, adequate data on birth outcomes and SES must be available; however, SES information is not routinely collected in most perinatal surveillance databases, as Luo and colleagues point out in this issue of the Journal.⁶

In most epidemiologic research, there is an increased understanding that SES is more than a nuisance variable. The practice of stating that "the results were controlled for SES," with SES representing education, income, occupation or whatever "social variable" is available, is no longer viable. But what constitutes adequate data on SES? A recent special communication in *JAMA* on SES in health research recommended that measures "should be selected and interpreted thoughtfully in the context of plausible explanatory pathways through which socioeconomic factors may influence health."⁷

We suggest that different social factors reflect different things, depending on the outcome under study. Occupational status represents a social stratification measure, but it is also an indicator of what people in an occupation are exposed to: at work, people may be subject to physical, chemical and bio-

logic exposures directly or through the air. Noise, heavy lifting, a fast work pace, monotonous movements, long working hours and shift work lead to bodily strains and exhaustion. These circumstances may affect a fetus in a negative way.^{8,9} Stress has been related to hormonal changes, and occupational strain may result in shortened duration of pregnancy and babies who are small for their gestational age.^{10,11} People's income determines their material conditions, such as nutritional intake; the frequency of overcrowded, damp, cold or unhygienic dwellings; and the possibility of rest and holidays. The air and water quality and sewage disposal of where one lives are further components of the physical circumstances determined by income that affect birth outcome.¹² Educational attainment is the social variable that often displays the largest socioeconomic differential.¹³ This may in part be because education affects income and occupation. However, education also represents the dimension of knowledge, which may be why education is associated with, for example, the ability to understand public health messages. Educational attainment, which is acquired over many years, may be a more sensitive indicator of childhood and adolescent socioeconomic circumstances than income and occupation.

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Luo and colleagues examined the association of maternal education and a small-area measure of income with birth outcomes, and they concluded that, although each variable had an independent effect on birth outcomes, education had the strongest effect. Had data on income and maternal education been available at both the individual and community level, it would have been possible to compare their effects at the 2 levels. As the authors point out, small-area income can be considered a proxy for individual income, which is an often-used

strategy when individual-level data are unavailable.¹⁴ But the differences in the precision with which maternal education and income are assessed would make the comparison of effects at the individual level problematic. Correspondingly, it is difficult to compare the relative importance of the individual versus the small-area-level effect on SES when SES is measured differently at the 2 levels. Decomposition of the effects of SES into individual-level and small-area-level contribution requires similar data at both levels.

However, as Kaufman recently noted, the dichotomy between compositional and contextual effects on health is largely an analytic abstraction.¹⁵ If we are to examine the effects of SES on birth outcomes, we should include the measures available that can help elucidate potentially important mechanisms, regardless of whether they are assessed at an individual or ecologic level.

The paper by Luo and colleagues has several praiseworthy details. Crude as well as adjusted odds ratios are provided, since one could argue that the real measure of social inequality is the crude estimate, whereas the adjustment variables indicate the mechanisms by which socially determined health inequalities are created. The data presented in the tables also enable us to assess absolute as well as relative differences, which is important to determine whether — and what — public health actions should be taken.¹⁶ The authors must also be applauded for examining the association between rural and urban settings and the socioeconomic gradient in birth outcomes. Rural/urban can be interpreted as a proxy for the physical and social environment shared by a group of people (e.g., opportunity structures, shared norms, environment, availability of resources and easy access to antenatal care). A seminal study by Frohlich and colleagues convincingly showed how moving beyond our traditional indicators (income, education) of SES can improve our understanding of contextual (e.g., small-area) effects.¹⁷ Coincidentally, the study by Frohlich and colleagues was carried out in Quebec, as was the current study. Unfortunately, this strategy places even greater demands on the availability of data.

But where can we turn to for data sources? The increasing number of birth cohorts established in recent years provides a valuable data source.¹⁸ Surveys and, in particular, population-based registries are excellent data sources with a variety of information on the individual level. These sources can be used to determine social inequalities in birth outcomes and, there-

fore, strategies for moving closer to the intentions in Article 1 in the Declaration of Human Rights.

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REFERENCES

- Office of the High Commissioner for Human Rights. Universal Declaration of Human Rights. Available: www.unhcr.ch/udhr/lang/eng.htm (accessed 2006 Mar 20).
- Ben Shlomo Y, Kuh D. A life course approach to chronic disease epidemiology: conceptual models, empirical challenges and interdisciplinary perspectives. *Int J Epidemiol* 2002;31:285-93.
- Harding JE. The nutritional basis of the fetal origins of adult disease. *Int J Epidemiol* 2001;30:15-23.
- Davey Smith G. Socioeconomic differentials. In: Kuh D, Ben-Schlomo Y, editors. *A life course approach to chronic disease epidemiology*. Oxford: Oxford University Press; 1997. p. 242-73.
- Baird D. The influence of social and economic factors on stillbirths and neonatal death. *J Obstet Gynaecol Br Emp* 1945;52:217-34.
- Luo ZC, Wilkins R, Kramer MS, for the Fetal and Infant Health Study Group of the Canadian Perinatal Surveillance System. *CMAJ* 2006;174(10):1415-20.
- Braveman PA, Cubbin C, Egerter S, et al. Socioeconomic status in health research: one size does not fit all. *JAMA* 2005;294:2879-88.
- Zhu JL, Knudsen LE, Andersen AM, et al. Laboratory work and pregnancy outcomes: a study within the National Birth Cohort in Denmark. *Occup Environ Med* 2006;63:53-8.
- Zhu JL, Hjollund NH, Andersen AM, et al. Shift work, job stress, and late fetal loss: The National Birth Cohort in Denmark. *J Occup Environ Med* 2004;46:1144-9.
- Kramer MS, Goulet L, Lydon J, et al. Socio-economic disparities in preterm birth: causal pathways and mechanisms. *Paediatr Perinat Epidemiol* 2001;15(Suppl 2): 104-23.
- Henriksen TB, Hedegaard M, Secher NJ. The relation between psychosocial job strain, and preterm delivery and low birthweight for gestational age. *Int J Epidemiol* 1994;23:764-74.
- Blane D, Bartley M, Davey Smith G. Disease aetiology and materialist explanations of socioeconomic mortality differentials. *Eur J Public Health* 1997;7:385-91.
- Arntzen A, Nybo Andersen AM. Social determinants for infant mortality in the Nordic countries, 1980-2001. *Scand J Public Health* 2004;32:381-9.
- Diez Roux AV. Investigating neighborhood and area effects on health. *Am J Public Health* 2001;91:1783-9.
- Kaufman JS. Socioeconomic context. *Epidemiology* 2006;17:4-5.
- Andersen AM. Commentary: Social inequalities in risk of stillbirth — the price of success? *Int J Epidemiol* 2001;30:1301-2.
- Frohlich KL, Potvin L, Chabot P, et al. A theoretical and empirical analysis of context: neighbourhoods, smoking and youth. *Soc Sci Med* 2002;54:1401-17.
- European Birth Cohorts. Available: www.birthcohorts.net (accessed 2006 Mar 20).

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