However, the authors also state that during the three visits, “all blood pressures were taken by the same three observers. . . .” Was it possible to blind these observers to their own previous measurements done during earlier visits? How was this type of observer bias accounted for?

Second, the authors have ignored a major source of variability—instrument error. Standardization of sphygmomanometers before each visit is as critical to reducing variability as is standardization of procedures.

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Response from Mullin, et al.

We thank Dr. Grossman for his comments on our article, The Variability of Blood Pressure Measurements in Children. Unfortunately, perhaps due to the space limitations placed on our article, our description of the study left two questions unanswered concerning sources of variability: observer bias and instrument error. We did account for these two causes of variability as well as we could.

First, we believe the observers were blind to previous blood pressure measurements on any given child either from an earlier visit or on the same day as taken by another observer. Each observer recorded the children’s blood pressures in her own log book. Before the second and third visits, the pages from the previous visit were removed so that the observers could not see their previous measurement(s). The possibility of an observer remembering a blood pressure measurement between visits cannot be ruled out, but there were no measurement outliers that would jog the memory, and scheduling the visits two weeks apart helped to alleviate the problem of an observer remembering a given measurement.

Secondly, it is standard operating procedure in field studies to standardize equipment prior to the start of a study and then to perform daily checks in the field. The sphygmomanometers were standardized in a laboratory at the beginning of the study. Between visits, the instruments were recalibrated according to the manufacturer’s recommendation.

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Epidemiologic Studies of Immigrants Urged

The recent work of Hopkins and Clarke1 confirms a trend toward increased undesirable pregnancy outcomes in the latest Southeast Asian immigrants which we had seen in our earlier California survey2 but had been unable to confirm due to small sample size. Our study which had better pregnancy outcomes was almost entirely Vietnamese, immigrants from the 1978–1980 “second wave” of arrivals; the “first wave” arrived 1975–1977.

Hopkins and Clarke report on the “third wave” composed mostly of Laotians including the Mien and Hmong Highlands Tribes and also some Kampucheans. These are some of the least educated and most unsophisticated people to set foot in America. It is difficult for them to even imagine modern advances in prenatal care and family planning. The very shock of dislocation from the rural tropics to the post-industrial US must be a psychological-social-cultural upheaval of unimaginable proportions. It is not surprising that their pregnancy outcomes are not as good as those of more educated, largely urbanized Vietnamese who had a far narrower gulf to bridge. We wholeheartedly concur with Hopkins and Clarke that far greater health education outreach efforts must be made toward the “third wave” of Asian immigrants.

Moreover, we must realize that these Asian arrivals are not alone. In the Southwest we find increasing numbers of immigrants from rural Mexico and El Salvador. In Florida there is an influx of Haitians, the poorest country in the Western hemisphere. Their problems may be similar to those reported by Hopkins and Clarke.

It is unfortunate that there have been so few studies on pregnancy outcomes in immigrants from less developed nations. The issue is critical, because such immigration is not likely to cease. We urge that many more epidemiological studies be done—the sooner, the better.

REFERENCES

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Hopkins and Clarke Respond

We concur with the remarks of Goldenring and Davis. It is worth noting that not only were the Highland Lao (Hmong and Mien) the predominant component of the “third wave” of Indochinese Refugees but that 41.5 per cent of the women in these ethnic groups were of child-bearing age (15–44 years). Within three and 38 times as high birth rates were recorded, particularly among older women, a group for whom pregnancy generally is of greater risk. Additionally, only 23.4 per cent of the Hmong and 22.7 per cent of the Mien had 10 or more prenatal visits compared to 60.3 per cent of the Vietnamese, the group generally least at risk among the refugees and with the lowest fertility rate. These data reported in our study indicate that while there are commonalities among the refugees, they should not be treated as a homogeneous group.

Within the Hmong sub-group, the minimum fertility rate was over four times as high as the 1979 US rate, 304.7 vs 68.5 respectively. Among five-year age classes, the age-specific birth rates ranged between three and 38 times as high as the US rates with the higher rates occurring among older (=35 years) mothers. By age, the respective Hmong and US rates were: 15–19 year-olds, 216.2 and 53.4; 20–24 year-olds, 370.7 and 115.7; 25–29 year-olds, 436.2 and 115.6; 30–34 year-olds, 386.7 and 61.8; 35–39 year-olds, 229.5 and 19.4; and 40–44 year-olds, 148.1 and 3.9.

When refugees receive adequate prenatal care and education, favorable birth outcomes (as indicated by low birthweight) occur with greater frequency than to the average Oregonian and US resident, 3.2 per cent low birthweight compared to 4.9 per cent and 6.9 per cent, respectively. The importance of educational outreach programs and access to prenatal care cannot be over-emphasized.

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