Workload and Seasonal Variation in Birthrates: Some International Comparisons*

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RECENTLY NURGE (1970) explored the relationship between the seasonal pattern of birth rates and work load. Examining a month-by-month record of children born each year from 1886–1965 in the German peasant village of Burkhards, Nurge concluded that “more babies are born in the period when there is less work to be done.” More recently, Thompson and Robbins (1973) re-examined the question of seasonal variation in conceptions employing monthly data from peasant populations in rural Uganda for 1957–1966 and Mexico for 1963–1970. Their “findings did not support, and in fact appeared to contradict the hypotheses proposed by Nurge which stress the importance of workload as a major determinant of seasonal variation in conception and birth-rates”. At the same time Thompson and Robbins were concerned with methodology. Although stressing the tentative nature of their findings “pending more carefully designed research”, they demonstrated the importance of using “eclectic, multivariate models for exploring the multiple effects of socio-cultural and climatic variables on seasonal variations in the frequency of conception and birth.”

The purpose of this paper is fourfold: first we comment on Thompson and Robbins’ results in light of a more reasonable length of interval between conception and birth. Second we reassess Thompson and Robbins’ conclusion regarding the importance of the relationship between workload and seasonal variation in conception relative to other factors such as rainfall, temperature and migration. Third we suggest that spectral methods provide a further means for examining seasonal fluctuations and apply this technique to the data collected both by Nurge (1970) and by Thompson and Robbins (1973). Finally we report briefly on our own investigations wherein, employing fairly extensive and wide ranging data, we attempt to relate the seasonal pattern of births to economic and cultural factors in various historical and social circumstances.

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Some Remarks on Method

Nurse as well as Thompson and Robbins calculate months of conception by “counting back nine months from month of birth”. Thus a birth in January is related to conception in May, leaving on average an eight month birth interval. The numbers of weeks in eight months is roughly 35. On average it is estimated that the birth interval is 38 weeks. Thus only those births occurring in the last nine or ten days of the month would on average be correctly registered as conceptions eight months ago. In our example the births in the first three weeks of January should be attributed to conception in April (rather than May). We therefore have related the data to conception a full nine months before birth.

In their analysis Thompson and Robbins dichotomize all variables as lying above or below the mean and assign a value one or zero respectively. They justify this on the ground that other authors have found a curvilinear relation between climatic variables and conception, and that this dichotomization will “prevent the relationship from being suppressed”. Using this method, Thompson and Robbins find that monthly conceptions in Uganda are best explained by rainfall and in Mexico by migration (zero order correlation coefficients r = 0.645 and r = 0.400 respectively). We agree that it may be easier to get a correlation if the figures are dichotomized as zero and one. All that is needed for a relationship is that the average number of conceptions in months with higher than average rainfall be greater than for months with lower than average rainfall. In fact we find that the zero order correlation coefficients using an eight month birth interval in both Uganda and Mexico are hardly affected by removing the dichotomization. This correlation procedure using the original data does assume that the relationship, if any, will be a straight line. However, the plot of average rainfall against average monthly births appears from the few observations to be sufficiently close to a straight line. Despite the weakness of fitting anything with such few observations, we feel that linear regression analysis on non-dichotomized data, so that no information is lost, is equally appropriate as the use of correlation coefficients by Thompson and Robbins. Further, as well be seen particularly in the case of Mexico, the regression method shows the nature of the relationships rather more clearly.

Thompson and Robbins Reconsidered

With the illegitimate assumption of an eight month birth interval we find

1 Although Nurse (1970) writes “A necessary assumption I have used in my analysis is that the gestation period is nine months”, she relates conception to births with an eight month interval.

2 See Allan F. Guttmacher, Pregnancy and Birth: Cygnet. He estimates that on average there are forty weeks from the first day of the last menstrual period. We have made the normal assumption that conception occurs two weeks from this date.

3 Detailed results are available from the authors on request.