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Exploring the relationship between macroeconomic factors and perinatal outcomes

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Recent epidemiological evidence suggests that the prevalence of preterm birth is increasing in countries with reliable data.¹ The adverse sequelae of preterm birth on mortality, functional, neurodevelopmental and behavioural outcomes are well documented,² although less is known about the economic consequences of preterm birth.³ Much research has focussed on individual-level clinical, behavioural, psychosocial and sociodemographic factors thought to contribute to preterm birth, as well as the biological pathways leading to preterm birth and the potential contributing roles of gene-environment interactions and environmental toxicants.⁴ In contrast, relatively little is known about economic factors that contribute to preterm birth, either at the level of the individual household or at the macroeconomic level.

In this issue of *Paediatric and Perinatal Epidemiology*, Margerison and colleagues⁵ draw upon a state-wide dataset of 2,657,272 singleton births in the US state of Michigan covering the period 1990-2012 to report a statistical association between state-level unemployment rates during pregnancy and preterm birth. Economic theories have posited that deteriorating economic conditions may influence perinatal outcomes through a number of channels, including household and individual resources, parental health behaviours, psychosocial stress and environmental exposures. The analysis by Margerison and colleagues⁵ has a number of strengths. Notably, the authors performed an elegant maternal fixed effects analysis, i.e. a sibling comparison design, restricted to mothers with at least one preterm birth, and thereby accounted for both time-variant and time-invariant maternal factors. They found that each percentage point increase in state-wide unemployment during the first trimester was associated with a 3% increase in the odds of preterm birth. When translated to a risk ratio, each percentage point increase from the mean unemployment rate was associated with an increased probability of preterm birth of 0.008. Although the authors describe these effects as modest, unemployment rates across Organisation for Economic Co-operation and Development (OECD) member countries increased by three percentage points, on average,

during the 2008-2009 economic crisis. Translating these effects at the aggregate level could result in substantially more preterm births if these associations are truly causative.

Confidence in the authors' findings is increased by the robustness of the results to an alternative measure of unemployment (county-level) and alternative model specifications (e.g. a random effects model).

As with any research study, there are limitations to the work by Margerison and colleagues.⁵ Notably, the authors were unable to account for the economic circumstances of individual women or households. Previous research based on the Panel Study of Income Dynamics in the United States has suggested that parental job losses have significant negative effects on infant health.⁶ This highlights the need for research that explores the effects of both the economic circumstances of individual households and macroeconomic conditions on perinatal outcomes, as well as an identification of the main mechanisms through which economic resources translate into better outcomes for infants.

The study by Margerison and colleagues⁵ raises an interesting conundrum. If increases in state-wide unemployment during the first trimester are associated with increased odds of preterm birth, why aren't reductions in preterm births evident during periods of economic upturn? After all, unemployment rates have declined in most industrialised nations over the past seven years, whilst national estimates of preterm birth rates have remained stubbornly high, including in the United States.^{7,8} Two factors are worthy of consideration here. First, the association may only hold in periods of acute economic crisis when striking increases in unemployment rates are symptomatic of profound economic decline that damages the social fabric. It is noteworthy that in the authors' analyses the association between unemployment and preterm birth rates no longer holds when births between December 2007 and March 2010 (what the authors describe as the Great Recession period) are excluded. Second, the study findings may be particular to the state of Michigan and may be of limited generalisability to

other jurisdictions. Unemployment benefit schemes vary greatly between industrialised nations. Even within the United States, there is great variation between state-level unemployment insurance programmes. It is plausible that the relatively low nominal value of unemployment benefits in the state of Michigan contributed to the findings and that the association between unemployment and preterm birth rates dissipates in jurisdictions with more generous systems of social welfare.

Margerison and colleagues⁵ observe birth ordering effects with evidence of a positive and significant association between unemployment and preterm birth rates for mothers for whom the preterm birth was first, and a negative and significant association for mothers for whom the term birth was first. These findings are not explained by differences in maternal characteristics or exposure levels during first pregnancies. A weakness of the study is that the routine data used did not permit an exploration of the contributing roles of individual-level clinical, behavioural, psychosocial and socioeconomic factors that are likely to be relevant. Nonetheless, the findings do point to likely different mechanisms being responsible for the associations across birth order.

What are the implications of the work of Margerison and colleagues⁵ for future research and for public policy? First, there is a need to corroborate the study findings using longitudinal data that links women's life histories of preterm delivery, as well as contextual integration linking individual biological, behavioural, psychosocial, sociodemographic and socioeconomic factors to community or state-level determinants of preterm birth.⁴ The notion that macroeconomic indicators such as high unemployment rates are associated with deleterious consequences for preterm birth rates is not new.⁹ Neither is the link between economic factors and health outcomes unique to the perinatal context.¹⁰ Nevertheless, further research on the contributions of economic factors, at both the macroeconomic and household-levels, to rates of preterm birth might inform new avenues for prevention and remedial

strategies and move beyond the narrow biomedical focus that has characterised the field. Establishing a causative link between community or state-level unemployment rates and preterm birth rates, and one that holds across economic and social care systems, should be readily sold to policy makers. The array of known health benefits associated with reducing unemployment would be expanded.¹¹ In contrast, establishing a causative link between individual-level economic well-being and the risk of preterm birth may prove a harder sell to policy-makers. Indeed, promotion of policies such as cash transfers designed to reduce the risk of adverse perinatal outcomes are likely to be met with some resistance.

About the author

Stavros Petrou is Professor of Health Economics at Warwick Medical School, University of Warwick, in the UK, leading high quality economic evaluations and research alongside large Phase III clinical trials and within health technology appraisal reviews. His research has centred on economic aspects of perinatal and paediatric health and health care. He has published widely on the economic consequences of preterm birth. Stavros is the economic advisor to Cochrane Collaboration 'Pregnancy and Childbirth Group'. He has acted as an expert advisor to US Institute of Medicine 'Committee on Understanding Premature Birth and Assuring Healthy Outcomes', and a member of the Nuffield Council on Bioethics Working Party on 'Critical Care Decisions in Fetal and Neonatal Medicine'.

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