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the fetal death was diagnosed 1 day after normal surveillance, including a normal biophysical profile in 1 case and a nonstress test that was reported to be reactive in the other. It is unknown whether the other patients were also undergoing antenatal fetal surveillance, given the limitations of a systematic review. Most of the patients who suffered a stillbirth were reported to have been treated with ursodeoxycholic acid, and some cases reported decreasing serum bile acids in response to treatment.

So, what is the optimal approach to ICP? Clearly more research is necessary to better understand the pathophysiology of fetal death in order to guide interventions and management. Given the strong association of TBA levels with stillbirth, measurement of these levels and management accordingly are reasonable. However, it is important to acknowledge that although antenatal surveillance is recommended, with discussion of the risks and benefits of delivery at 36 to 39 weeks of gestation, this strategy will not prevent all cases

of stillbirth. Because ICP likely occurs as an abrupt event rather than due to chronic placental insufficiency, given that this disease is not associated with fetal growth restriction, antenatal fetal surveillance is less likely to be of benefit. That being said, it is at present the only tool we have. And although the risks of late preterm delivery are increasingly appreciated in general, it is reasonable to discuss timing of delivery with any patient with ICP and to offer the option of delivery at 36 weeks (the lower end of the SMFM guideline) given the timing and unpredictability of stillbirth in these cases. Conversely it is probably does not make sense to deliver patients with itching but normal bile acids early, rather it is more appropriate to wait until 39 weeks. Finally, because preexisting liver disease is a strong risk factor for ICP, patients with this diagnosis should have an evaluation postpartum. This particularly makes sense given that there are increasing effective treatments for some of the potential underlying liver disorders.—MEN)

Association Between Income and Perinatal Mortality in the Netherlands Across Gestational Age

Joaquim Vidiella-Martin, Jasper V. Been, Eddy Van Doorslaer, Pilar García-Gómez, and Tom Van Ourti

Erasmus School of Economics, Tinbergen Institute and Erasmus Centre for Health Economics Rotterdam, Rotterdam, the Netherlands (J.V.-M., E.V.D., P.G.-G., T.V.O.); Centre for Health Service Economics and Organisation, Nuffield Department of Primary Care Health Sciences, University of Oxford, Oxford, United Kingdom (J.V.-M.); and Division of Neonatology, Department of Paediatrics, Erasmus MC Sophia Children's Hospital (J.V.B.), Division of Obstetrics and Fetal Medicine, Department of Obstetrics and Gynaecology, Erasmus MC Sophia Children's Hospital (J.V.B.), and Department of Public Health, Erasmus MC (J.V.B.), University Medical Centre Rotterdam; and Erasmus School of Health Policy and Management (E.V.D., T.V.O.), Rotterdam, the Netherlands

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ABSTRACT

While the contribution of socioeconomic status to disparities in neonatal death and stillbirth has received considerable attention, several key aspects remain understudied. These include the specificity of the association between household income and perinatal outcomes and the contribution of gestational age and birth weight to income-related disparities in perinatal mortality.

This large nationally representative cross-sectional study aimed to examine the association between household-level income and perinatal mortality in the Netherlands while investigating the effect that birth weight mediates this association. Data on all registered singleton births born between 24 and 42 weeks of gestation in the Netherlands and household-level tax records were compiled between January 2004 and December 2016. Household income rank was the main exposure variable, calculated by ranking annual disposable income of the mother's household, adjusted by size, from 1 to 100 relative to the distribution of households with a childbirth for each year separately. The primary study outcome was perinatal mortality defined

as intrauterine death occurring after 24 weeks of gestation or death up to 7 days after live birth. The association between household income rank and perinatal mortality was controlled for potential confounders including maternal age at delivery, parity, ethnicity, year of birth, and newborn sex. Birth weight centile adjusted for gestational age, and sex was included as a potential mediator of this association.

A total of 2,036,431 births were included in this analysis, of which 121,010 (5.9%) were born preterm, and 8720 died during the perinatal period. Mothers of non-Western race/ethnicity comprised 40.6% of the lowest-income quintile and 7.0% of the highest-income quintile. Mean perinatal mortality was 4.3 per 1000 and decreased with increasing income rank from 5.9 in the lowest to 3.2 per 1000 in the highest. In unadjusted and when adjusting for confounders, higher household income rank was associated with lower perinatal mortality. When adjusting for confounding factors, the negative association between perinatal mortality and household income rank had a bottom-to-top ratio of 1.79 (95% CI, 1.62–1.98), which was attenuated to 1.30 (95% CI, 1.22–1.39) when adjusting for birth weight centile. When stratified by gestational age, there was a negative association on adjusted analysis between household income rank and perinatal mortality in all but the lowest gestational age category (24 weeks to 25 weeks 6 days) with bottom-to-top ratios ranging from 1.21 (95% CI, 1.05–1.43) between 26 and 28 weeks and 1.29 (95% CI, 1.13–1.51) between 28 and 32 weeks. Sensitivity analysis confirmed a negative association between household income and perinatal mortality other than among early gestational ages.

This large cross-sectional study demonstrated an association between maternal household income rank and perinatal mortality that was only partially mediated when controlling for birth weight and was absent among infants born at less than 26 weeks of gestation. In addition, each increase in household income rank carried a larger decrease in mortality at the bottom half of the income distribution than in the top half, suggesting income differences at the bottom end are more impactful.

EDITORIAL COMMENT

(It is well understood that many health outcomes vary by an individual's socioeconomic status. The causal relationship between income or wealth and health has many possible pathways including nutrition, access to health care, and lifetime stress, and in some, income strata may be further associated with poor health habits such as smoking or sedentary lifestyle that can enhance poor health. The association between socioeconomic status and outcomes is applicable to pregnancy as well, with a particular association with preterm birth. In fact, the socioeconomic impact may be changed through upward mobility. A study demonstrated that women who were born into poorer neighborhoods had a higher rate of preterm birth if they still lived in a poorer neighborhood as compared with those who moved to a wealthier neighborhood (*Am J Public Health* 2011;101:714–719).

The overall economy can affect pregnancy outcomes. The idea there is that the environment of a worsening economy leads to an increase in an individual's stress along with the concomitant negative health impacts. For example, an article examined changes in the cesarean rate in response to unemployment and found increased cesarean deliveries with greater unemployment rates, particularly in male fetuses (*BMC Pregnancy Childbirth* 2014;14:198). In a recent study, authors examined the impact of the recent recession in the United States on pregnancy outcomes (*Am J*

Epidemiol 2017;186(10):1131–1139). They found that there was an increase in preterm birth as state unemployment increased. In particular, the association was with unemployment in the first trimester. Further, the effect of a 1% increase in unemployment during the recent recession had an even bigger effect (16%) that declined essentially back to baseline (4%) after the recession.

When the impact between wealth, income, or socioeconomic status is examined in relation to perinatal mortality, it is thought that some of that impact must be mediated through preterm birth as suggested above. However, there are few studies that tease out that association. In the study abstracted above, the authors examined household income in the Netherlands and its association with perinatal mortality. They used both gestational age and birth weight as potential confounders and to examine the impact that these factors were having on the relationship between income and perinatal mortality. They found that indeed there is an association between both income and perinatal mortality that is less when gestational age is controlled for. Interestingly, they also found that impact on perinatal mortality by increasing household income rank was not consistent across the entire income strata. The reduction in perinatal mortality was greater by increasing income in the lower strata than in the upper strata. Given that these findings are from the Netherlands, which has an

excellent social safety net and has less widely distributed income than the United States, is important when translating to our population. One would think that the increase in income in the bottom stratum in the United States might be even more impactful and that the same increase in the top stratum in the United States might be even less impactful.

So, what do we do as clinicians? Well, we cannot change our patients' incomes, but we can work to consider what income is doing in how it is impacting our patients' outcomes. If it is stress, can we use group prenatal care or recommend cognitive behavioral therapy to reduce this impact? For nutrition, there are programs such as WIC (Women, Infants and Children) that may lead to some clinical benefit. If we think that it is impacting their home lives, we can work with social services on issues such as housing and employment. If it is impacting access to care, we can work to ensure that patients have access even during unusual hours. But, truly, the burden of these findings falls more squarely on policy makers. This is evidence that underlies the benefit of living wages, of increasing the minimum wage,

of creating more robust social safety nets, of creating a more equitable society with a particular focus on bringing up the lower socioeconomic stratum. Our economy has grown appreciably over the past 50 years, but those benefits have been more concentrated and focused among the top stratum both in terms of income and wealth. The ratio between the highest income stratum and lowest is higher now than it was in the 1920s after it had declined until the 1970s. The proportion of wealth held by the top 1% of the population is almost as high as it was in the 1920s, again rising continuously since the 1970s. Given that the health benefits are greatest when you increase income in the lowest stratum, if you simply transferred modest amounts from those in the top stratum to the bottom stratum, you would have the largest health outcome impact. We do have taxation policies to do this, but over the past decades, our approach has been to lower taxes on those in the highest economic stratum, rather than increase them. In the end, if we value the health of our population, it would serve us all to have a flatter rise in income and wealth in our society.—ABC)

Trends, Characteristics, and Outcomes of Placenta Accreta Spectrum: A National Study in the United States

Shinya Matsuzaki, Rachel S. Mandelbaum, Rauvynne N. Sangara, Lauren E. McCarthy, Nicole L. Vestal, Maximilian Klar, Kazuhide Matsushima, Rodolfo Amaya, Joseph G. Ouzounian, and Koji Matsuo

Division of Gynecologic Oncology, Department of Obstetrics and Gynecology (S.M., R.S.M., R.N.S., K. Matsuo), and Keck School of Medicine (L.E.M., N.L.V.), University of Southern California, Los Angeles, CA; Department of Obstetrics and Gynecology, University of Freiburg, Faculty of Medicine, Freiburg, Germany (M.K.); and Division of Acute Care Surgery, Department of Surgery (K. Matsushima), Department of Anesthesiology (R.A.), Division of Maternal-Fetal Medicine, Department of Obstetrics and Gynecology (J.G.O.), and Norris Comprehensive Cancer Center (K. Matsuo), University of Southern California, Los Angeles, CA

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ABSTRACT

Placenta accreta spectrum (PAS) describes the phenomenon wherein the trophoblastic placental tissue morbidly attaches to the myometrium of the gravid uterus, preventing normal detachment and causing morbidity. Depending on the degree of invasion, PAS is categorized as accreta if attached to the myometrium without decidua, increta if invasion occurs into the myometrium, and percreta if invasion through the myometrium into surrounding organs occurs. The incidence of PAS has increased over the last few decades; however, national statistics related to pregnancies with PAS and outcomes related to PAS are limited.