

Portland State University

PDXScholar

OHSU-PSU School of Public Health Faculty
Publications and Presentations

OHSU-PSU School of Public Health

5-2023

Expanding on the Solutions to Reduce Neonatal Intensive Care Unit Morbidity and Mortality for Extremely Premature Infants—Looking Out the Hospital Window and Into the Neighborhoods

Christina Jäderholm

OHSU-PSU School of Public Health, cmj8@pdx.edu

Lynne C. Messer

OHSU-PSU School of Public Health, lymesser@pdx.edu

Follow this and additional works at: https://pdxscholar.library.pdx.edu/sph_facpub



Part of the [Medicine and Health Sciences Commons](#)

Let us know how access to this document benefits you.

Citation Details

Jäderholm, C. M., & Messer, L. C. (2023). Expanding on the Solutions to Reduce Neonatal Intensive Care Unit Morbidity and Mortality for Extremely Premature Infants—Looking Out the Hospital Window and Into the Neighborhoods. *JAMA Network Open*, 6(5), e2313351-e2313351.

This Article is brought to you for free and open access. It has been accepted for inclusion in OHSU-PSU School of Public Health Faculty Publications and Presentations by an authorized administrator of PDXScholar. Please contact us if we can make this document more accessible: pdxscholar@pdx.edu.



Invited Commentary | Pediatrics

Expanding on the Solutions to Reduce Neonatal Intensive Care Unit Morbidity and Mortality for Extremely Premature Infants—Looking Out the Hospital Window and Into the Neighborhoods

Christina M. Jäderholm, MS, DC; Lynne C. Messer, PhD, MPH

The study from Sullivan et al¹ is a valuable contribution to the literature that aims to improve health equity among very preterm infants (and their families). It is to be lauded for its attention to nonclinical factors such as area-level deprivation and racial disparities. By examining community-level factors such as area deprivation, this study engages both the medical and public health communities and places infant outcomes directly within the context of housing policy and lack of neighborhood investment. However, it is important that we articulate the connections between area deprivation and adverse outcomes for very preterm infants to even conceive of solutions outside the scope of more patient care. In this commentary, we add historical context to the conditions that predispose very preterm infants in the neonatal intensive care unit (NICU) to morbidity and mortality and look for solutions to the health disparities observed within the hospital by considering the disparate and disenfranchising geographies that produce its young patients.

An important element of the design of the study by Sullivan et al¹ is the standardized neonatal care provided across the 4 NICUs. It removes the variability associated with differential access and quality of care and enables us to turn our attention to the social environment in which the offspring were conceived and gestated. The authors note that, "Once premature infants leave the neonatal intensive care unit (NICU), socioeconomic deprivation in the home environment adversely impacts neurodevelopmental outcomes,"¹ which is undoubtedly true. The authors also note that, "Socioeconomic disadvantage impacts maternal health and access to care."¹ Both the health of the gestating parent and access to care are important features affecting infant neurodevelopment but are themselves insufficient in their effect because fetal development is also associated with sociodemographic settings.

The developmental origins of health and disease framework² suggests that the prenatal period is critical for offspring health and that gestational exposures (eg, poor nutrition, chronic stress, and unhealthy environmental conditions³) can contribute to preterm delivery and impaired neurodevelopment outcomes.⁴ Considering area-level environments after delivery is important, because we know that families tend to return to the same environments in which they gestated, but limiting one's consideration to post-NICU environments misses an essential half of the critical development window. Furthermore, if infants have been primed during gestation for unhealthy postpartum exposures,^{4,5} overcoming these gestational exposures may be difficult.

Another commendable feature of the study by Sullivan et al,¹ and one with which we agree wholeheartedly, is its nod to housing discrimination and the structural racism that produces disadvantaged Black and brown neighborhoods.⁶ Despite their appropriate attention to structural confounding (Black and White parents largely living in different Area Deprivation Index deciles), the authors note, "it becomes essential to consider social disparities as a significant mediator of racial disparities."¹ Unfortunately, the mediation analysis called for by the authors will not be possible because racist policies (eg, redlining) produce racially and ethnically segregated environments; those where mostly residents from historically minoritized racial and ethnic groups live are starved of resources, thereby producing substantial inequities between predominantly Black and White neighborhoods. The social disparities the authors seek to isolate is not a mediator between area deprivation and NICU morbidity and mortality; it is yet another outcome of structural racism.

+ Related article

Author affiliations and article information are listed at the end of this article.

Open Access. This is an open access article distributed under the terms of the CC-BY License.

Intervening upon the stark inequities between Black and White households will require a much longer look, both in terms of distance out the window and in terms of historical factors.

When looking for solutions to complex problems, we are often presented with several options; these options might be different interventions, policies, or treatment plans, and they all represent different levers we can pull to change the outcome. These levers may all have the potential to produce favorable outcomes, but may do so by approaching the problem from a different angle or by working through different mechanisms. What equity-focused levers could we consider pulling to give very-preterm infants an equal chance of survival during their NICU stay?

A lever we would typically turn to in this context would be to improve treatment quality or efficacy, but that is not a lever that would make much difference to the infants described here,¹ since they all received high-quality care from their doctors and hospitals. Another possible lever could be to increase access to prenatal care for persons gestating in areas with high levels of area deprivation, but standard prenatal care has been found to have limited positive influence in preventing very preterm delivery.⁷

However, what if one considered levers farther upstream? What if we moved the intervention focus to a different and potentially more impactful lever: policies around community investment?

Focusing on community investment may very well produce improved outcomes. For instance, funding schools equitably would result in a more educated population, one with higher rates of employment and employer-provided benefits, which may likely result in better prepregnancy health. Equity-focused land use policies would mean that environmental contaminants do not get concentrated in specific neighborhoods and/or that all neighborhoods have access to fresh air and green space. Business incentives to move (safe) industry or other employment opportunities to neighborhoods where unemployment rates are high may result in more working parents with resources to enable their children to thrive. Sullivan et al¹ did an excellent job helping to focus the reader toward the adverse effects of area deprivation. Here, we wish to ally with the authors by extending the consideration of solutions and possible intervention space into that which coincides with their area-level exposures of interest.

Medicine and public health are natural partners in addressing the causes of poor health and identifying viable solutions. Medicine practices locating the cause(s) of a health outcome, whereas public health will help to ensure a population-level consideration and impact of identified interventions. Together in robust collaborations, these 2 disciplines can advocate for cross-sector community-engaged efforts in area investment,⁸ which means, as per the issues raised by this study,¹ we are tasked with intervening upon the very fabric of socioeconomic distributions and systematically disenfranchised neighborhoods.

The areas in which people conceive and gestate influence fetal susceptibility to morbidity and mortality, and the areas in which people conceive and gestate are influenced by policy. Highly specialized NICU care is critically important for very preterm infants and their families, as is the access to prenatal care. What is equally important, but rarely prioritized, is extending the idea of what constitutes an appropriate and effective intervention to the fundamental causes of the exposure, to the causes of area deprivation. For this to happen, we need medicine and public health at every intervention table emphatically pointing our collective gaze out the hospital window.

ARTICLE INFORMATION

Published: May 11, 2023. doi:10.1001/jamanetworkopen.2023.13351

Open Access: This is an open access article distributed under the terms of the [CC-BY License](#). © 2023 Jäderholm CM et al. *JAMA Network Open*.

Corresponding Author: Christina M. Jäderholm, MS, DC, School of Public Health, Oregon Health & Science University–Portland State University, 1810 SW 5th Ave, 610-10, Portland, OR 97201 (cmj8@pdx.edu).

Author Affiliations: School of Public Health, Oregon Health & Science University–Portland State University, Portland.

Conflict of Interest Disclosures: None reported.

REFERENCES

1. Sullivan BA, Doshi A, Chernyavskiy P, et al. Neighborhood deprivation and association with neonatal intensive care unit mortality and morbidity for extremely premature infants. *JAMA Netw Open*. 2023;6(5):e2311761. doi:10.1001/jamanetworkopen.2023.11761
2. Gluckman PD, Buklijas T, Hanson MA. The developmental origins of health and disease (DOHaD) concept: past, present, and future. In: Rosenfeld CS, ed. *The Epigenome and Developmental Origins of Health and Disease*. Academic Press; 2016:1-15.
3. Messer LC, Boone-Heinonen J, Mponwane L, Wallack L, Thornburg KL. Developmental programming: priming disease susceptibility for subsequent generations. *Curr Epidemiol Rep*. 2015;2(1):37-51. doi:10.1007/s40471-014-0033-1
4. De Asis-Cruz J, Andescavage N, Limperopoulos C. Adverse prenatal exposures and fetal brain development: insights from advanced fetal magnetic resonance imaging. *Biol Psychiatry Cogn Neurosci Neuroimaging*. 2022;7(5):480-490. doi:10.1016/j.bpsc.2021.11.009
5. Boone-Heinonen J, Messer LC, Fortmann SP, Wallack L, Thornburg KL. From fatalism to mitigation: a conceptual framework for mitigating fetal programming of chronic disease by maternal obesity. *Prev Med*. 2015;81:451-459. doi:10.1016/j.ypmed.2015.10.012
6. Yang Y, Cho A, Nguyen Q, Nsoesie EO. Association of neighborhood racial and ethnic composition and historical redlining with built environment indicators derived from street view images in the US. *JAMA Netw Open*. 2023;6(1):e2251201. doi:10.1001/jamanetworkopen.2022.51201
7. Barfield WD. Public health implications of very preterm birth. *Clin Perinatol*. 2018;45(3):565-577. doi:10.1016/j.clp.2018.05.007
8. Jutte DP, Badruzzaman RA, Thomas-Squance R. Neighborhood poverty and child health: investing in communities to improve childhood opportunity and well-being. *Acad Pediatr*. 2021;21(8S):S184-S193. doi:10.1016/j.acap.2021.04.027