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A constellation of complexity: unpacking the multiple disadvantages underlying inequities in maternal mortality

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Title: **A constellation of complexity: unpacking the multiple disadvantages underlying inequities in maternal mortality**

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Key points:

1. Lack of clarity in conceptualising the complex factors leading to inequities in maternal mortality may result in nihilism in clinical practice and research.
2. Visualising the multiple disadvantages affecting marginalised mothers as layers of a "Swiss cheese" model may encourage individuals to intervene and improve outcomes.
3. Social science research tools may help to interrogate the systemic biases leading to an increased risk of maternal mortality through a lens of intersectionality.

Commentary:

Although numerous studies have described socioeconomic and ethnic disparities in maternal mortality in the UK, MBRRACE-UK reports of Confidential Enquiries into Maternal Deaths and Morbidity have continued to highlight that these inequities persist. The latest report underlines the importance of "not los[1] sight" of the actions required to address the systemic biases acting to produce ethnic and socioeconomic gradients in

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maternal mortality, and refers to the need for widespread action across the health and social care system to address these biases[2]. Importantly, the report features an evocative image: a "constellation of systemic biases" representing intersecting biological, psychological and social factors leading to maternal mortality[2].

How a problem is conceptualised is key to how it is investigated and addressed. As such, the conceptualisation of multiple intersecting factors leading to an increased risk of maternal mortality is clearly relevant in determining if and how we unpack and address them. In her essay "*Epidemiology and the web of causation: has anyone seen the spider?* ", Prof Nancy Krieger elucidates the power of visual metaphors to direct the purpose and approach of studies of disease distribution[3]. The web of causation, she argues, led researchers to prioritise identification of individual components or "strands" of the web which could be "cut" to prevent disease. Researchers did not question the origin of the web itself, and thereby deemed the causal mechanisms by which disease distributions arose unworthy of investigation. Considering the impact the "web of causation" has had in directing epidemiological enquiry, it may be helpful to consider the implications of the constellation featured in the MBRRACE-UK report for research and clinical practice.

Biomedical complexity is challenging in itself to address within our healthcare system, with multidisciplinary medical care for pregnant women with complex medical needs proving difficult to facilitate[2]. Thus, when healthcare professionals are faced with a constellation of biological, social and psychological factors affecting the outcomes of pregnant women and their babies which are outside their realm of control, they may be overwhelmed, pessimistic or even nihilistic. The term "clinical nihilism", originally coined by Dr Paul Farmer to describe the attitude of the global health community towards providing high-quality healthcare for those living in poverty across the world[4], is apt in this situation. Do we consider how the constellation came to exist? It is probably impossible to deduce. Can we alter the configuration of the constellation? It is too complex – where would we start? It is tempting to continue defining the existing constellation, by repeatedly describing existing health disparities without substantive efforts to unpick or address them. In view of the current strain on the NHS, it would be all too easy to "lose sight" of the systemic biases leading to disproportionate maternal mortality in marginalised populations.

Is it possible instead to conceptualise the multiple factors leading to an increased risk of maternal mortality in a version of the Swiss cheese model (Figure 1)? We could construe the systemic biases highlighted by the MBRRACE-UK report not as errors embedded within systems, but as disadvantages manifesting themselves repeatedly during interactions with health and social care workers throughout the pregnancy and the life-course more generally (Figure 1). As with other "never events" within healthcare systems, his model highlights the fact that there are multiple potential opportunities for intervention by individuals within health and social care systems, which may help to mitigate clinical nihilism.

Acknowledging the importance of intersectionality is essential when investigating the systemic biases leading to an increased risk of maternal mortality. Intersectionality is a term introduced by Prof Kimberle Crenshaw to describe the oppressions that Black women faced due to the intersecting effects of racism and sexism[5]. A key message is that "racism and sexism factors into Black women's lives in ways that cannot be captured wholly by looking at the race or gender dimensions of those experiences separately" – intersecting oppressions lead to a result not only greater than but also different from the sum of their parts. The concept of intersectionality is evidently pertinent to the study of systemic biases in maternal healthcare – in fact, the MBRRACE-UK report of Confidential Enquiries into Maternal Deaths and Morbidity 2015-17 specifically highlights the overrepresentation of mothers with severe and multiple disadvantages amongst those who died[6]. However, commonly used quantitative methods are limited in their ability to encompass intersectionality. For example, adjusting for confounders such as race, mental illness and socioeconomic status, without full consideration of the causal pathways along which these factors exert their effects, only accounts for the co-occurrence of these factors and does not capture their interactions.

Luckily, intersectional methodological approaches to describing and analysing health inequities have already been described in the social science literature. Trans-disciplinary collaborations with our social science colleagues would empower us with the tools to interrogate the complexity depicted in the constellation. One such tool is the index of concentration at extremes, a measure of inequity which simultaneously captures

concentrations of affluence and deprivation[7](Figure 2). This metric has already been used to delineate the intersectional impact of race and economic deprivation on the risk of preterm birth in the United States[7]. Another tool is the directed acyclic graph (DAG) – in these graphs, arcs are used depict assumptions regarding the causal relationships between variables[8]. DAGs could be used in studies of risk factors for maternal morbidity and mortality to encourage researchers and readers to methodically consider how these risk factors intersect, and the result of such intersections[9]. In turn, studies explaining the nature and consequences of the intersecting risk factors could help to refine the Swiss cheese model of maternal health inequity through an iterative, translational process (Figure 1).

As the COVID-19 pandemic continues to expose and exacerbate socioeconomic and health inequities, it is imperative that we avoid nihilism regarding maternal health disparities in both research and clinical practice. Mothers from marginalised groups have been dying disproportionately for too long, and it is time to translate awareness into action.

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Contribution to Authorship

KR conceived of the idea for the article and wrote the article.

Details of Ethics Approval

N/A

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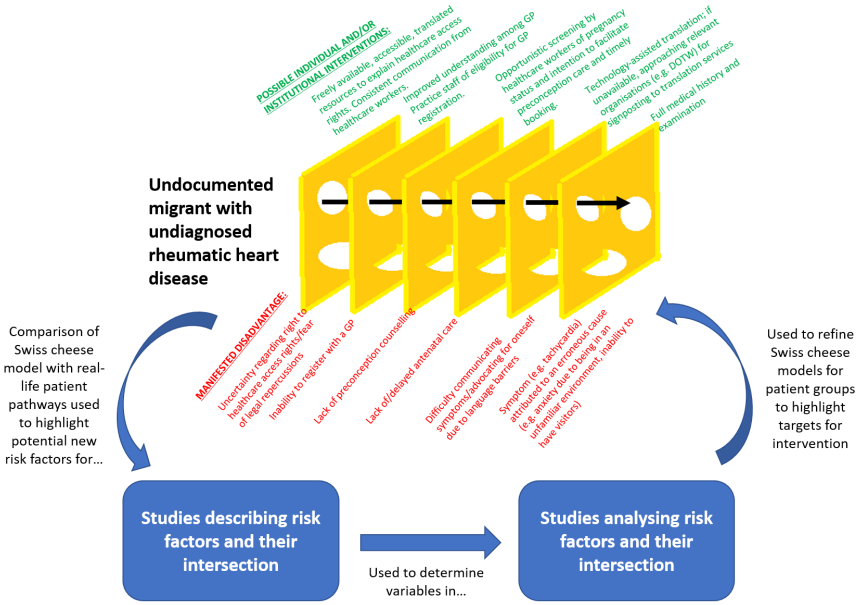
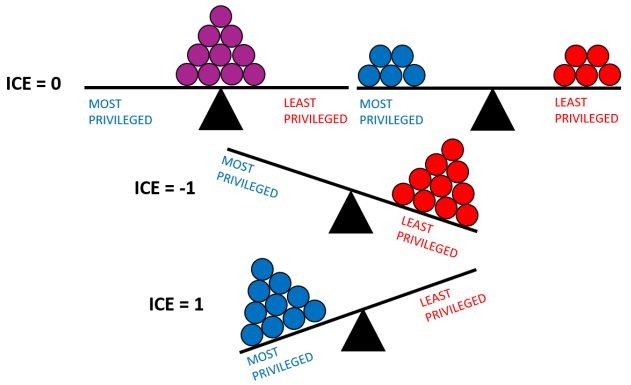


$$\text{Index of Concentration at the Extremes (ICE)} = \frac{[\text{Number of people with most privilege(s)}] - [\text{Number of people with least privilege(s)}]}{\text{Total population for whom privilege was measured}}$$

$$\text{e.g. } \frac{[\text{Number of white people in high income households}] - [\text{Number of black people in low income households}]}{\text{Total population for whom ethnicity and household income was measured}}$$



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