Columbia World Projects: Maternal Heath Forum Report

May 9, 2019

Foreword

Dear Reader,

On behalf of Columbia World Projects (CWP), we are pleased to present the following report on our Forum on Maternal Health, one of an ongoing series of meetings dedicated to bringing together academics and practitioners to address fundamental challenges facing humanity.

Maternal health, the topic of the CWP Forum on which this report is based, is a vital concern for all societies around the world. The wellbeing of pregnant women and mothers, and the care they receive before, during, and after delivery, is integral to the health of every mother and child, and to the families and communities to which they belong. Yet while significant progress has been made in improving maternal health over the last several decades, in recent years the rate of progress in a number of countries has slowed considerably or even regressed. Meanwhile, gaps in access to high quality maternal health care – not only between regions and countries, but also within countries – are growing.

According to the World Health Organization (WHO), approximately 830 women still die every day from preventable causes related to pregnancy and childbirth, while countless others are affected by maternal morbidity. In the United States – where a recent report indicated that over 60 percent of pregnancy-related deaths were preventable – the number of women dying from childbirth is increasing rather than decreasing, and unacceptable disparities in maternal mortality and morbidity along racial lines are growing, driven in part by pervasive and longstanding inequities.

On January 29, 2019, CWP invited approximately 35 experts from inside and outside of Columbia University who represent a range of substantive and institutional perspectives, to deepen our understanding of why it has proven so challenging to achieve global health targets for maternal health, discuss the root causes of the problem, and identify ways in which we might substantially improve maternal health outcomes. Out of nearly 20 ideas proposed and described in this report, three will now be developed further by CWP as potential projects, based on the recommendations of experts at the Forum. Many of the remaining proposals will be pursued through other channels and as they are, CWP will work to foster their development and track their impact.

CWP Fora seek to inspire even the most advanced experts to see vexing problems in new ways, and encourage partnerships that might lead to breakthroughs that improve lives. Thus, in sharing the insights of those who have generously given their time and intellectual capital to our effort, as we have in this report, we hope others will benefit from the ideas they proposed and conclusions they reached. We recognize that the breadth of expertise on maternal health is vast, so we welcome feedback on all parts of the report, and in particular on ways we might improve the proposals selected for further development by CWP.

Nicholas Lemann
Director, Columbia World Projects

Avril Haines
Deputy Director, Columbia World Projects

Nik Steinberg
Forum Director, Columbia World Projects

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I.   The Challenge

According to the latest estimates from the World Health Organization (WHO), more than 300,000 women die each year due to mostly preventable causes related to pregnancy and childbirth.[1] In fact, the actual number of lives lost is almost certainly higher, as accurate reporting on maternal mortality is often unavailable, and the number of deaths is likely to be underreported. Moreover, many magnitudes more women are affected each year by associated health challenges, commonly referred to as maternal morbidity, which may not take their lives, but are nevertheless severe during pregnancy, childbirth, or the postpartum period, and may have enduring negative effects or leave them permanently disabled.[2] While the prevalence of maternal morbidity is even harder to track, the WHO reports that out of about 135 million women who give birth each year, 20 million are estimated to experience pregnancy-related illnesses after childbirth.[3] In short, the problem of maternal health is significant and the impact on society is substantial, often leading to long-term economic and social consequences both for the immediate family and the wider community.

In 2015, UN Member States included as one of the UN Sustainable Development Goals (SDG)[4] the target of attaining a global maternal mortality ratio of fewer than 70 maternal deaths per 100,000 live births by 2030, yet we are not remotely on track to achieve this goal. The latest global numbers reflect a ratio of 216 maternal deaths per 100,000 live births and the rate of decline is well below what would be necessary to reach the SDG goal in 2030.[5] Maternal mortality dropped globally by almost 44 percent from 1990 to 2015, but despite this progress, the rate of decline has slowed or stalled in a number of countries, and in some has even regressed. What is perhaps most surprising about this is the fact that many interventions needed to reduce maternal deaths and morbidity are relatively straightforward and often inexpensive.[6] Much of the Forum's opening plenary discussion focused on why progress has slowed, stalled, or lapsed, and the main obstacles that stand in the way of improving maternal health.

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[1] World Health Organization, *Maternal Mental Health*, accessed March 5, 2019, https://www.who.int/mental_health/maternal-child/maternal_mental_health/en/.

[2] Maternal morbidity ranges from mild, short-term effects to severe, long-term disabilities, and quality data regarding the number of morbidity events is hard to come by.

[3] World Health Organization, *Maternal Mental Health*, accessed March 5, 2019, https://www.who.int/mental_health/maternal-child/maternal_mental_health/en/.

[4] Resolution adopted by the United Nations General Assembly, *Transforming Our World: The 2030 Agenda for Sustainable Development*, A/RES/70/1 (September 25, 2015), https://sustainabledevelopment.un.org/post2015/transformingourworld/publication.

[5] See, *e.g.*, Mary Ellen Stanton *et al.*, "Beyond the Safe Motherhood Initiative: Accelerated Action Urgently Needed to End Preventable Maternal Mortality" in *Global Health: Science and Practice* Vol 6 No. 3 (Aug. 2018), noting that "[m]any countries will need to double, or more than double, their current annual rate of reduction of maternal mortality to ensure sufficient progress toward national targets and the global Sustainable Development Goals."

[6] Nonetheless, it is worth noting that some interventions, such as a Caesarian section to save the life of a mother or child, or both, and an operation to prevent severe morbidities like obstetric fistula, are costly and require significant expertise.

If there is an overall trend in maternal health, participants noted, it is the growing gap between and within countries. The disparity between the group of countries with the lowest maternal mortality and those with the highest maternal mortality doubled between 1990 and 2013 (from 100 to 200 times as high) and almost all maternal deaths – 99 percent – occur in low-income countries, with more than half occurring in sub-Saharan Africa. Additionally, the maternal health gap between sub-populations within countries appears to be increasing as well, most likely as a consequence of social and economic status. This is especially evident in the United States, where the rate of women dying from causes related to pregnancy and childbirth has been increasing rather than decreasing, and where, for example, non-Hispanic Black women are three to four times more likely to die from pregnancy related causes than non-Hispanic White women.[7] In reviewing the status of maternal health and these various trend lines, participants agreed that improving health systems to more effectively provide women with access to high quality health care was critical but insufficient. Truly addressing the problem would also require addressing and mitigating against a series of structural biases that typically overlap with social and economic inequities.

Addressing the challenge of maternal health will also require better data, according to participants. While the volume of data collected around maternal health has increased significantly with advances in technology, not surprisingly, the populations for which we have the least amount of quality information tend to be the populations with the poorest maternal health. Not only does this suggest that we may be significantly underestimating the incidence of maternal health issues, but also that we lack information about its nature that is critical to effectively address it. Approximately two-thirds of maternal deaths are unregistered or misclassified,[8] for example, and data on maternal morbidity in vulnerable communities are even scarcer and less reliable than that on mortality.

Participants discussed these various challenges and highlighted three ways that our understanding of their root causes – and ways to address them – are evolving, as well as their implications for potential CWP projects attempting to significantly improve maternal health outcomes.

From Access to Quality of Care

Participants pointed out that there are parts of the world and crises – both natural and human-made – in and during which women have no access at all to maternal health care, or where it is exceptionally challenging to obtain access. Furthermore, even in places where in theory women

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[7] American College of Obstetricians and Gynecologists, Racial Disparities in Maternal Mortality in the United States: The Postpartum Period Is a Missed Opportunity for Action, https://www.acog.org/-/media/Departments/Toolkits-for-Health-Care-Providers/Postpartum-Toolkit/ppt-racial.pdf?dmc=1&ts=20190113T0809014824.

[8] Oomman N., Mehl G., Berg M., and Silverman R., "Modernising vital registration systems: why now?" *The Lancet* Vol. 381 Issue 9875 (April 20, 2013), https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(13)60847-8/ppt.

have access to high-quality health systems, in reality many women in those places have no effective access without financing mechanisms, such as insurance, which may not be available at all, or may be temporally or otherwise limited. As a result, women even in places of high-quality systems are deprived of access to care for some of the most common and serious pregnancy-related problems that arise.

Moreover, as participants noted, the enduring disparities in places where access to maternal health has been expanded demonstrates that if the quality of care provided is poor, unacceptable rates of mortality and morbidity will persist. One participant cited a recent *Lancet* study finding that poor quality care is now a bigger barrier to reducing mortality in health systems than insufficient access, with 60 percent of maternal deaths in low-income and middle-income countries attributed to poor-quality care.[9] What's more, expanding access to poor quality care can diminish limited resources without improving health, and may even foster public distrust in the health system as a consequence of the lack of results, poor treatment, or even abuse.

Participants highlighted that the focus on *access to care*, rather than *access to quality care*, had led to too much focus on programs and metrics reflecting contact with a health system, and not enough focus on the processes, patient experiences, and health outcomes of that system. This imbalance, however, is shifting, as is evidenced by the emergence of new global standards, such as the UN Sustainable Development Goals, which explicitly call for "access to quality essential health-care services," and set out a specific target outcome in reduction of the global maternal mortality ratio; and the WHO's new framework for improving the quality of care for mothers and newborns, which focuses on both the "provision and experience of care." In sum, any program intended to address maternal health should look not only at access to health care, but rather at access to quality health care.

Systems-Based Change

Very much in concert with the points made regarding the need to improve the quality of care accessible to women, participants discussed the importance of investing in systems-based models of change, which focus on how elements of care operate individually and in connection with each other in order to positively influence health outcomes and improve efficiency, thereby reducing cost. The drivers of maternal mortality and morbidity are often so complex and multi-faceted, several participants argued, that the best way to improve outcomes is through taking a comprehensive approach to strengthening the entire health system.[10] Such an approach can be useful at all levels of the health system and may warrant, for example, technological innovation and support, advanced data analytics, interoperable devices, new incentive structures,

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[9] Margaret Kruk, *et al.*, "High-quality health systems in the Sustainable Development Goals era: time for a revolution," *The Lancet Global Health Commission*, Vol. 6 Issue 11 (Nov. 1, 2018), https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(18)30386-3/fulltext.

[10] The *Lancet* report defines high-quality health systems as being equitable, resilient, efficient, and focused on people. "High-quality health systems in the Sustainable Development Goals era: time for a revolution," *supra* note 3.

innovative financing mechanisms, information sharing, effective and timely referral systems, supportive culture and leadership, and engaging patients, families, clinicians, and the broader public. An effective systems approach model is one that standardizes and embeds evidence-based best practices while also driving continuous improvement.

Several participants noted that addressing maternal health in low income countries and humanitarian crises often means working in environments where health systems are weak and brittle – when they exist at all – so that taking a systems approach, as an initial matter, will require additional resources and time, as systems will need to be shored up or even built in the first place. Nevertheless, such a broad-based approach has proven effective in multiple countries in Africa for delivering anti-retroviral treatment for people living with HIV/AIDS, others noted. Multiple participants made the case that, in taking such an approach, it is critical to include mental health, which is often treated as secondary to the physical health of a pregnant woman or new mother, despite the fact that it is fundamental to her well-being and can impact her physical health. Additionally, participants called attention to a pair of obstacles that make a systems-based approach more challenging to implement in the United States: the unwillingness of providers to share data about patients and outcomes in general, which are often viewed as proprietary; and the lack, or lack of quality of, insurance coverage, which can undermine a systems approach by not covering key kinds of care, and by not covering certain individuals, particularly those from vulnerable or marginalized groups.

Social Determinants of Health

Participants discussed at length the social determinants of maternal health, and how such drivers cannot be addressed solely through clinical approaches. Maternal health must be viewed in the context of social and cultural systems, participants said, where a woman's health is shaped by the interaction between clinical care and broader forces (such as the environment where she lives and structural inequalities), neither of which can be understood or tackled in isolation. Part of recognizing the complex drivers of maternal health, one participant pointed out, is recognizing that there is no silver-bullet solution for maternal mortality and morbidity; instead, a range of interventions need to be layered – one atop another – to make incremental progress. Some of these interventions may be broadly applicable, while others may need to be tailored to the specific context or individual, such as a woman's past experience with the health system, or the neighborhood or country where she lives. Multiple participants noted an inherent tension in such an approach: while the varied determinants of poor maternal health necessitate interventions that are comprehensive, the nature of such multi-faceted solutions makes it difficult to separate out the parts of the intervention that are effective from those that are not, and can make it harder to identify causation, as opposed to correlation, and take to scale effective efforts.

There was consensus that the history and legacy of discrimination and inequality on the basis of race, ethnicity, gender, socioeconomic status, and disability, among other factors, needs to be taken into account by systems, providers, and policymakers. As one participant put it, health systems and communities each have histories, and those histories need to be understood and

addressed when designing systems of care and providing services. The history of slavery, race-based medical experiments, and exploitative global development projects were cited as examples of the abusive and tainted histories of such systems, which affect both the perception and the nature of care to this day. One participant called for deeper thinking about the principle of equity in maternal health, and in particular the role of government in ensuring that the distribution of maternal health resources is based on need and on remedying historical injustices.

Participants called attention to the critically important role that trust plays in improving maternal health, especially among vulnerable populations. Systems need to be built on an understanding of the areas of distrust between patients and providers, and the implicit biases that they bring to their interactions. Participants highlighted the importance of designing systems that imbue women's voices and experiences with respect, and – in the words of one participant – treat them as experts in their own care. Consequently, participants underscored the importance of consistently ensuring women's engagement and leadership in the design of maternal health models and evaluating the care they provide. Another participant noted that while it is crucial to focus on vulnerable populations, it is equally important not to view such groups as homogenous or lose sight of the fact that each patient has a unique set of needs and a distinct set of experiences that inform her view of the health system.

Throughout the discussion, participants made clear that efforts to improve maternal health should be not be limited to the period shortly before and after birth, as the drivers of maternal mortality and morbidity may impact women long before conception, and that the consequences of poor maternal health care often extend long after pregnancy and delivery. Moreover, special attention must be paid to the significant, unacceptable disparities among different subsets of the population – disparities that reflect and exacerbate rising inequality in many countries, including in the United States. Such gaps can be obscured by statistics that look at countries, states, or even cities as the unit for measuring maternal health, as opposed to disaggregating populations in ways that can reveal worse outcomes among vulnerable groups that reflect enduring inequities in our societies.

II.   Working Group Discussions

The Forum participants separated into five working groups, the topics for which were selected in the run up to the Forum based on discussions with participants and other experts in maternal health, as critical areas that require focused attention and innovative approaches: mental health; racial and other unacceptable disparities; systems approaches; environmental factors; and adolescent maternal health and preterm birth.

Each working group consisted of approximately eight experts, who were asked to evaluate between two and five project proposals that had been developed in advance of the Forum by participants, in collaboration with CWP staff. Participants had been pre-assigned to working groups in an effort to bring together complementary fields of expertise, while simultaneously

representing different schools of thought in areas where splits exist in the expert community, with the idea of promoting a maximally effective interrogation of each project idea.

For each project proposal, the lead drafter presented a succinct summary of the idea, after which the working group's moderator facilitated a discussion aimed at providing critical feedback. Participants were asked to focus their discussion around the following questions:

- Strengths and weaknesses. Are there key weaknesses, omissions, or risks in the framing of the problem or the proposed solution? How can the project be strengthened?
- Implementation challenges. What are the greatest obstacles to effectively implementing this project, and can they be overcome?
- Likely impact. If successful, what magnitude of impact will the project likely have on improving maternal health? Is the project scalable?
- Role of the university. Does research and/or scholarship play a significant role in the project?

Before breaking into the working groups, the CWP Forum organizers pointed out that the groups' themes, like the drivers of maternal health outcomes, were naturally overlapping. In fact, several of the projects dealt with more than one of the themes identified and thus could easily have been assigned to another working group. As such, participants were asked not to limit their evaluation of assigned projects to the overarching theme of their working group. Rather, participants were encouraged to consider how the individual projects they were evaluating were impacted by the themes of other groups, and how those projects might address some of the key challenges being taken up by other groups.

After discussing all of the individual projects, the working groups were asked to prioritize the ideas they had reviewed, from the perspective of which projects CWP should pursue, and summarize the main points and any recommendations they wished to make regarding each project to the plenary of Forum participants.

What follows is a discussion of each of the five working groups, including the overarching theme, the specific projects discussed, and the critical feedback received.

1. Mental Health

Mental health problems – experiences of depression, anxiety, and stress – are frequently overlooked and are rarely addressed, undermining the quality of women's lives, contributing to poor birth outcomes, and impacting fetal and child health trajectories. Depression is one of the biggest risk factors for maternal self-harm death, including by suicide or overdose.[11] According to the WHO, roughly 10 percent of pregnant women and 13 percent of women who have just

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[11] K. Mangla, *et al.*, "Maternal Self-Harm Deaths: An Unrecognized and Preventable Outcome," *American Journal of Obstetrics and Gynecology*, March 5, 2019, e-publication ahead of print, https://www.ncbi.nlm.nih.gov/pubmed/30849358.

given birth experience a mental disorder, primarily depression.[12] In the United States, 10 to 15 percent of women experience prenatal and/or postpartum depression, with a higher rate among women living in poverty.[13] The incidence of behavioral health issues – which in addition to mental health include substance use disorders and anxiety – is even higher than that of mental health problems. Nevertheless, despite the established efficacy of several treatment options, most pregnant women with mental health problems do not get treatment due to a range of barriers to access, such as a lack of insurance coverage and stigma. In the United States, even women with health insurance routinely lack coverage for mental and behavioral health care. In 2015, behavioral care in the United States was 3.6 to 5.8 times more likely than medical or surgical care to be provided out-of-network,[14] which is almost always more expensive and less convenient. The mental health working group looked at two proposals aimed at embedding mental health care into efforts to overcome these obstacles to access and improve maternal health.

Drop-In Mothering Centers – A Group Family Nurture Intervention to Address Emotional and Behavioral Disorders and Improve Health for Mothers and Children: The first project would develop, refine, and test a community-based, scalable model of a "Drop-In Mothering Center," which would use a Family Nurture Intervention approach to help families with children experiencing emotional and behavioral disorders, focusing on mothers and children from the time children are born to age five. The intervention aims to establish an emotional connection and co-regulation of the autonomic nervous systems[15] of the mother and the child, over the course of up to six group sessions led by trained specialists. The treatment focuses on helping bring the child to a calmed state through a series of measures including sustained mother-child physical contact, emotional communication, and eye contact. In addition to those sessions, families would also have the ability to "drop in" to the center for additional help as they needed it. The project proposed to locate the Drop-In Centers in five locations run by established community organizations in New York City as a pilot to demonstrate the efficacy of such an embedded model, the findings of which could be used to scale up the program to other parts of the City and beyond.

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[12] World Health Organization, *Maternal Mental Health*, accessed March 5, 2019, https://www.who.int/mental_health/maternal-child/maternal_mental_health/en/.

[13] Bradley N. Gaynes, *et al.*, "Perinatal Depression: Prevalence, Screening Accuracy, and Screening Outcomes," Rockville, Maryland: Agency for Healthcare Research and Quality (2005), accessed March 2, 2019, https://archive.ahrq.gov/downloads/pub/evidence/pdf/peridepr/peridep.pdf.

[14] Milliman Research Report, *Addiction and mental health vs. physical health: Analyzing disparities in network use and provider reimbursement rates*, December 2017, http://www.milliman.com/uploadedFiles/insight/2017/NQTLDisparityAnalysis.pdf, 3.

[15] The autonomic nervous system is the part of the nervous regulates certain body processes, such as blood pressure and the rate of breathing, without a person's conscious effort. Merck Manuals, "Overview of the Autonomic Nervous System," accessed March 5, 2019, https://www.merckmanuals.com/home/brain,-spinal-cord,-and-nerve-disorders/autonomic-nervous-system-disorders/overview-of-the-autonomic-nervous-system.

Participants discussed how the widely held societal belief that mental health is less important than physical health is a barrier to pursuing any project that would focus on improving maternal health through mental health. The project's drafters noted the challenge is even greater with treatment focused on the autonomic nervous system, which traditionally has been seen as less important to mental health than the brain. Participants questioned how the program could be sustained beyond the five year duration of the project, when it would be supported by Columbia World Projects. Some queried whether Medicaid might offer a way to cover the costs, while others said an endorsement of the treatment model by respected institutions such as the Health Resources and Services Administration (HRSA) or the American Academy of Child and Adolescent Psychiatry would be helpful and might lead to other sources of funding. A participant suggested that rather than embedding the Drop-In Centers within smaller community organizations, the project should seek to embed the treatment into a number of Early Head Start programs and well-baby clinics. That would make it easier to measure the efficacy of the approach in more uniform settings. This recommendation was largely endorsed by the group, as a potentially better model of implementation were the project to go forward.

Improving Access to Mental Health Care in New York During Pregnancy and the Postpartum Period: The second project has two components. The first component would be to create a model program at Columbia University Irving Medical Center (CUIMC) for embedding mental health care into obstetrics primary care, with the aims of improving outcomes for mothers and children, decreasing costs, enhancing the experience of patients, and reducing stigma by making the option of accessing mental health services a routine part of perinatal care. The program would be modeled on the patient-centered medical home (PCMH) approach, which focuses on: (i) comprehensive care, (ii) patient-centered care, (iii) coordinated care, (iv) accessible services, and (iv) quality and safety.[16] Key elements of the project would be allowing patients to request behavioral health services from their first appointments with their Ob/Gyn, ideally at the same location; providing 8-15 psychotherapy sessions and a psychopharmacology consultation, as well as additional support as needed; and offering care through telemedicine, which offers both patient convenience and cost savings.

The second component of the project would be to simultaneously establish two care coordinators to field phone calls from obstetrician-gynecologists in locations across New York State who request a psychiatric consult or a psychotherapy referral in the patient's location, in order to dramatically increase access to improved mental healthcare during pregnancy and after childbirth. Modeled on the Massachusetts Child Psychiatry Access Program for Moms (MCPAP for Moms), this part of the project would be aimed at increasing evidence-based screening for, and treatment of, behavioral health disorders during pregnancy and the postpartum period. The program would also allow the care coordinator to offer psychotherapy sessions through telemedicine, thereby increasing direct access to behavioral health services.

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[16] B.F. Miller, *et al.*, "Payment reform in the patient-centered medical home: Enabling and sustaining integrated behavioral health care," *American Psychologist* 72(1) (January 2017), https://www.ncbi.nlm.nih.gov/pubmed/28068138.

As with the first project, it was noted that stigma around mental health issues, and in particular the societal pressure that pregnancy be a positive experience for mothers, often prevents women from seeking treatment for behavioral health issues during and after pregnancy. Another key challenge noted was the lack of insurance coverage, which is a main reason that behavioral care is not integrated more often into the PCMH approach. It was noted that engaging with insurance companies and hospitals to find ways to adjust their systems in order to make such care more accessible and affordable would be critical to the project's success. Without that, even being able to show positive clinical results may not be enough. An unanswered question was how insurance companies could be convinced that such an approach is in their interest. It was noted that the relationship between Columbia researchers and the CUIMC hospital would offer a unique advantage of having a built in partnership with a hospital, which may give them greater leverage in discussions with insurance companies.

2. *Racial and Other Unacceptable Disparities*

Experts have broadly accepted that a woman's chance of dying or becoming disabled during pregnancy and childbirth can be impacted significantly by her social and economic status; by the biases of her community, or specifically of health providers, which may discriminate against her or undervalue her voice; and by the geographic remoteness of her home. This is true in the United States and around the world, where 99 percent of maternal deaths occur in low-income regions. As the United Nations Population Fund (UNFPA) has found, "generally speaking the poorer and more marginalized a woman is, the greater her risk of death," as well as of severe morbidity.[17] But a series of additional structural biases that typically overlap with social and economic inequities, deserve a special focus due to their critical relevance to maternal health.

Specifically, in the United States, non-Hispanic Black women are three to four times more likely to die from pregnancy-related causes than non-Hispanic White women.[18] In New York City, the disparity is even more staggering, with non-Hispanic Black women eight times more likely to die than non-Hispanic White women.[19] While the causes of these disparities are still subject to debate, researchers and medical professionals increasingly accept that they are due in significant part to the impact of systemic and societal racism. The impact of such racism is felt in a variety of ways, including stress among mothers who are consequently at greater risk of

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[17] UNFPA, *The Social Determinants of Maternal Death and Disability*, December 2012, https://www.unfpa.org/resources/social-determinants-maternal-death-and-disability, p. 1.

[18] American College of Obstetricians and Gynecologists, "Racial Disparities in Maternal Mortality in the United States: The Postpartum Period Is a Missed Opportunity for Action," accessed January 22, 2019, https://www.acog.org/-/media/Departments/Toolkits-for-Health-Care-Providers/Postpartum-Toolkit/ppt-racial.pdf?dmc=1&ts=20190113T0809014824.

[19] According to the New York City Office of the Mayor, Black, non-Hispanic women are approximately eight times more likely than white, non-Hispanic women. New York City Office of the Mayor, "De Blasio Administration Launches Comprehensive Plan to Reduce Maternal Deaths and Life-Threatening Complications from Childbirth Among Women of Color," press release (July 20, 2018), https://www1.nyc.gov/office-of-the-mayor/news/365-18/de-blasio-administration-launches-comprehensive-plan-reduce-maternal-deaths-life-threatening.

other health complications, and racial discrimination in health care, including the dismissal of legitimate concerns and symptoms.[20] The Racial and Other Unacceptable Disparities working group considered five proposals that sought to address these disparities in maternal health care.

Leveraging Medicaid in the "Fourth Trimester": A Path to Averting Maternal Mortality and Morbidity in the United States: Under this project, an interdisciplinary team of Columbia researchers would work with jurisdictions or states to leverage Medicaid policy as a tool to avert pregnancy-related morbidity and mortality. The ultimate goal would be to identify best practices that could be adapted by other jurisdictions and states across the United States, as well as the federal government. Nearly half of all births in the United States are paid for by Medicaid. Yet due in part to the time-limited nature of Medicaid's pregnancy coverage and low levels of Medicaid coverage for parents in many states, nearly half of low-income pregnant women enrolled in Medicaid lose their health insurance in the six months after childbirth.[21] This loss of coverage contributes to 60 percent of pregnancy-related deaths that occur in the year after delivery, half of which are estimated to be preventable.[22] As of January 1, 2019, 31 states and the District of Columbia had implemented the expansion of Medicaid pursuant to the Affordable Care Act. This project would assist in the implementation of state health policy by gathering evidence about the ways Medicaid can significantly improve postpartum outcomes. The project would collect and leverage data and best practices from jurisdictions that have expanded Medicaid to inform other expansion states about what is working and what is not. It would then provide an evidence base that would help actors in jurisdictions that have not adopted the Medicaid expansion to make the case for its benefits. The team would partner with government agencies and/or community organizations in two jurisdictions: one that has expanded Medicaid, where it would work to improve the effectiveness of the coverage; and one that has not expanded, to better understand the needs and challenges faced by low income women without coverage in the year after delivery, and its adverse effects.

In the working group, participants discussed how a state's capacity to design its own Medicaid expansion and swiftly implement policy changes would make it an ideal partner for such an effort. Given the range of factors, however, that can affect women's health during pregnancy and after birth, participants questioned how the project would be able to parse out the degree to which certain health outcomes have been shaped (for better or worse) by insurance coverage. Participants underscored the importance of understanding the experiences of different subsets of the population, such as histories of racial discrimination, which might affect the way they view and experience Medicaid. And they noted that it would be critical to take such experiences into account when designing Medicaid expansions. A question was raised as to whether – in the

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20 Linda Villarosa, "Why America's Black Mothers and Babies are in a Life-or-Death Crisis," *New York Times Magazine*, April 11, 2018, https://www.nytimes.com/2018/04/11/magazine/black-mothers-babies-death-maternal-mortality.html.

21 Jamie Daw, *et al.*, "Women in the United States Experience High Rates of Coverage 'Churn' in Months Before and After Childbirth," *Health Affairs* Vol. 36, No. 4 (April 2017), https://www.healthaffairs.org/doi/10.1377/hlthaff.2016.1241.

22 *Report from Nine Maternal Mortality Review Committees, supra* note 1.

five-year period prescribed for CWP projects – it would be possible to show positive results, and whether the results could help catalyze grassroots or government efforts to push for reform in non-expansion states. A participant recommended that historically and geographically similar states might be paired in the research design to seek to control for some contextual factors. Multiple participants noted that elevating the voices of women and community organizations – particularly those serving racial minorities – would be critical.

Addressing Implicit Bias in Maternal Health Care: In this project, the Department of Obstetrics & Gynecology (Ob/Gyn) at Columbia University Irving Medical Center (CUIMC) would partner with Cook Ross, a firm that specializes in system-level interventions aimed at addressing unconscious bias, to develop a maternal health-specific implicit bias training course. Implicit bias can result in the dismissal of legitimate patient concerns and symptoms and contributes to poor birth outcomes among women of color, especially African-Americans. We have, however, only a limited understanding of the causes, prevalence, and impact of such bias on maternal health outcomes. In partnership with NewYork-Presbyterian (NYP), the proposed training course(s) would be implemented across the NYP/CUIMC system – ideally including each of the system's more than 300 providers who contribute to a mother's obstetric care – in order to address levels of implicit bias system-wide and begin filling this information gap. The project would explore how best to track the potential impact of the introduction of such training on health outcomes for women of color. Implicit bias curricula would include sessions to learn what bias is, where it comes from, and how bias operates in the brain. They would also provide tools shown to mitigate bias individually and organizationally. By showing that such training can lead to care that is more equitable, compassionate, and effective, this project would provide evidence to support similar interventions across the United States and beyond.

In the discussion, participants underscored the importance not only of conducting trainings, but of measuring whether they actually lead to changes in practice. To this end, participants stressed the importance of coming up with ways to compare the trajectories of mothers' care before and after CUIMC staff undergo bias training, possibly through a randomized controlled trial. It was also suggested that the project team conduct baseline qualitative research in the local community, in order to understand bias as it is experienced by patients and inform the design of the training modules. Indeed, if there was an overarching recommendation from the working group, it was the need to find more ways to engage patients in the design, implementation, and evaluation of the program. As one participant pointed out, simply measuring impact in terms of reductions to maternal mortality and morbidity is too narrow a metric; other measures would need to be conceived of – ones that can identify both positive and negative impacts. One idea put forward was to track maternal satisfaction with care and treatment by providers' impressions, perhaps through qualitative data collection. Another participant recommended the project incorporate interactions between patients and providers in less institutionalized community-based settings, and not just within CUIMC. Multiple participants expressed support for Columbia tackling this effort first within its own institution.

Merck for Mothers' Safer Childbirth Cities Initiative – Proposals from St. Louis, Missouri and Columbus, Ohio: The working group also considered two projects that had been proposed as

part of the Merck for Mothers' Safer Childbirth Cities Initiative. Merck for Mothers designs scalable solutions to help end preventable maternal deaths, focusing on empowering women, equipping health providers, and strengthening health systems. In 2018, Merck for Mothers launched the Safer Childbirth Cities Initiative to support U.S. cities with a high maternal mortality and morbidity. The goal is to help local stakeholders – including women's health advocates, community leaders, public health officials, hospital administrators, community-based health providers, and others – develop and implement evidence-based solutions that help their cities become safer and more equitable places to give birth, and to generate models for healthy pregnancy and safe childbirth that can be adopted by other cities. More than 70 applicants from cities across the United States submitted Expressions of Interest to be part of the Safer Childbirth Cities Initiative in October 2018.

From these submissions, and with the permission of the applicants, Merck for Mothers included four of these proposals as projects to be discussed in the context of the CWP Forum on Maternal Health. These projects were discussed in two working groups: this working group (on racial and other unacceptable disparities), and the systems approaches working group. While the proposals were not written with the CWP project criteria in mind, Forum participants were asked whether these ideas might be adapted as potential CWP projects, and whether there were other ways CWP or Columbia University might engage in, or learn from, the Safer Childbirth Cities Initiative.

The first Safer Childbirth Cities proposal – which came from St. Louis, Missouri's Integrated Health Network (IHN), and was called Improve Maternal Health and Reduce Disparities – proposed bolstering several existing maternal health-related initiatives in the city, where more than 33 percent of African Americans experience inadequate prenatal care, compared to 8 percent of non-Hispanic White women. The project proposed focusing on six lines of effort: i) fostering relationships between healthcare institutions, providers, and community members in order to create a learning exchange about issues, barriers, and power dynamics affecting maternal health; ii) identifying best practices from current pilot projects in St. Louis and from national programs, and applying them to prenatal care, labor, and delivery; iii) elevating the recommendations of African-American women on how to make employers – particularly those with large populations of low-wage workers – adopt better maternal health policies; iv) supporting local organizations in developing a pipeline of doulas and community health workers of color; v) ensuring decision makers across St. Louis are informed about health equity, birth equity, and the intersection between social determinants of health and clinical operations; and vi) assessing success in implementing various safety bundles to improve maternal health.

The second Safer Childbirth Cities proposal considered by the working group came from the community-based organization Restoring Our Own Through Transformation (ROOTT) in Columbus, Ohio, a Black women-led reproductive justice organization, and was called We Are Enough – Addressing and Impacting Maternal Health through a Community Based Perinatal (Doula) Support Model. In Columbus, babies born to Black women are 2.7 times more likely to die in their first year compared to babies born to White women. The overarching goal of the project would be to improve maternal outcomes among vulnerable groups, particularly Black

and Hispanic women, during the perinatal period (the period immediately before and after delivery), through expanding and improving on a community-based support model centered on doula care and services. The project would engage in four main activities to pursue this goal: i) conduct a study on Black maternal and infant health, based on interviews with clients and families and key outcomes among mothers and infants; ii) train and expand a cadre of culturally-concordant doulas; iii) convene key partners in acute care, outpatient, and community settings, and; iv) identify mechanisms to increase financial sustainability, such as Medicaid funding and hospital community benefit investments, as a means of eliminating financial barriers to doula access for those who may lack resources. The project would entail collaboration with a host of Columbus-based partners including medical providers, universities, and community organizations, as well as national partners such as the Black Mamas Matter Alliance.

Participants provided feedback on the two Safer Childbirth Cities Initiative projects in tandem. Noting that doulas played a central role in both proposed projects, participants acknowledged the growing support around the world for the use of birth companionship, and studies that have demonstrated the positive impact of birth companions. At the same time, participants pointed out that the term "doula" encompasses a huge range of practices and experiences, and that there are challenges to integrating birth companions into existing systems. Among the integration challenges raised by participants were: (i) how doulas interact with hospitals and other providers; (ii) what role hospitals have (if any) in hiring doulas; (iii) how to cover doula care using Medicaid and other forms of insurance, so that women with limited financial resources can access their services; and (iv) how to ensure doulas are adequately trained and culturally sensitized. On this last point, one participant noted that just as positive experiences with doulas can build trust and better health outcomes, negative experiences can generate distrust and poor outcomes. Multiple participants questioned what the role of Columbia University would be in the two projects – and more broadly, the role of research and scholarship, which is a key criterion for CWP projects. It was also noted that both projects appeared to already have university partners in or close to the communities they aimed to serve, raising the question of whether those local academic partners would be better placed to provide such input. A participant suggested the coalitions described in the proposals both appeared to form around birth outcomes rather than maternal outcomes, and stressed the importance of ensuring that the health of the mother was not relegated to secondary status, as often happens. Even if it was not clear whether these or other Safer Childbirth Cities projects would make the right fit for a CWP project, participants urged Columbia to find other ways to support collaboration with the initiative, including by perhaps building connections with Columbia faculty – given the shared goals, the opportunity to learn for one another, and the potential for impact.

Building Trust/Breaking Trust – Addressing Racial Disparities in Maternal Health in the United States: This final project discussed by the working group would work with communities in two U.S. cities to understand the roots of distrust; how care is experienced, including how such experiences are affected by incidents of disrespect and mistreatment; and the impact of such distrust on maternal health outcomes. Then, based on what is learned, the project would design a set of interventions to generate more respectful care and foster trust between women

and providers to improve maternal health. The project would have three phases: (i) extending participatory action research conducted on mistreatment of women by Columbia's Averting Maternal Death and Disability Program (AMDD) and the Black Mamas Matter alliance; (ii) collaborating with key stakeholders in New York City to integrate a trust and social capital perspective into existing initiatives to reduce racial disparities in maternal mortality and morbidity, with an eye towards targeting the forms of mistreatment identified in the first phase of research; and (iii) collaborating with the Merck Safer Childbirth Cities Initiative to allow participating cities to learn about the NYC effort, and either seek to adapt it to their respective communities, or come up with alternative interventions whose efficacy could be compared to the NYC approach.

In the discussion, participants were drawn to the project's approach in engaging the affected communities not only in understanding the drivers of distrust and experiences of mistreatment, but also in designing measures to generate trust and to provide respectful, dignified treatment. Participants praised the fact that the project looked beyond bias training and did not focus only on providers in an effort to address these complex challenges – a nuance that they suggested incorporating in other projects. One participant noted that research on whether trust-building has been shown to be effective – or the lack thereof – ought to be addressed in the proposal. Participants also noted the tension between the need to understand local context and dynamics in targeting distrust, and the project's aspiration to identify solutions that would be effective at addressing disparities across a range of contexts. Finally, multiple participants saw the potential for synergy between this project and others discussed by the group – both the "Leveraging Medicaid" project (as New York is a Medicaid expansion state and Georgia is not) and the "Implicit Bias" project (given the focus on targeting these challenges from the provider side).

3. *Systems Approaches*

A clear consensus has emerged in the public health field that well-being and illness are shaped not only by individual biology and behavior, but also by a range of factors, including social, economic, and environmental factors. This idea that the places where we live, learn, work, and play impact our relative well-being over years – known as the social determinants of health – has gained greater resonance in particular among experts in maternal health. At the same time, there is a growing movement to bring a systems approach to understanding and improving public health, which, in the words of leading systems thinkers, "considers connections among different components, plans for the implications of their interaction, and requires transdisciplinary thinking as well as active engagement of those who have a stake in the outcome to govern the course of change."[23] According to systems thinking, when trying to make change in highly complex spheres such as public health, it is critical to contemplate the broad range of stakeholders and methods that can be brought to bear, as well as to recognize,

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[23] Scott J. Leischow and Bobby Milstein, "Systems Thinking and Modeling for Public Health Practice," *American Journal of Public Health*, Vol. 96(3) (March 2006), https://ajph.aphapublications.org/doi/10.2105/AJPH.2005.082842.

seek to anticipate, and eventually measure and adapt to, the unintended consequences that may result from any effort to address a given challenge.

In the field of maternal health, an approach that takes into account both the social determinants of health and a systems approach means engendering a wider perspective that incorporates particular facets of the problem within the broader context of women's health, inequality, discrimination, and public policies, among other drivers of health outcomes. In doing so, it is additionally necessary to recognize the set of institutional and policy tools that must be employed to address the underlying structural challenges presented. The systems thinking working group considered four proposals that sought to apply such an approach to improving facets of maternal health.

Predicting Pregnancy Outcomes with Ultrasound Bio-Imaging Informatics, Biomechanical Simulations, and Machine Learning: This project is aimed at developing a clinical-friendly, enhanced data analytics and visualization tool that would employ patient-specific ultrasound imaging and maternal health data (e.g., age, body mass index, race) to predict the onset of labor and assess the risk for obstetric complications at the individual level. This would also enable patients to plan for labor and for targeted therapeutic interventions, where necessary. The project envisions this tool being used as early as the patient's first ultrasound exam. The proposed output would be an easy-to-read 3D rendering of the patient's maternal anatomy and its structural integrity; a prediction of when the patient will go into labor; a risk classification for preterm birth; and a risk classification for post-term complications. To build the tool, the project proposes three phases. First, *training* machine learning algorithms to identify the timing of labor and to classify risk of obstetric dilemmas based on patient-specific ultrasound bio-imaging informatics and maternal health demographics. Second, *validating* machine learning algorithms and engineering methodology on a separate cohort of patients not used to train models. And third, *implementing* the tool at Columbia University Irving Medical Center (CUIMC), as well as possibly with NGO and IO partners, by packaging software onto a clinical-friendly device. The project would draw on the disciplines of mechanical and biomedical engineering, computer science, data science, obstetrics, gynecology, and radiology, as well as partnerships with companies that build ultrasound technology. The potential impact would be to better identify women who are at the highest risk of obstetric dilemmas, particularly preterm birth (PTB). Approximately one in ten (roughly 500,000) babies are born premature in the United States every year[24] – a ratio that has not significantly decreased since the 1980s.[25][26] Globally 15 million babies are born too soon each year.[27] Babies who are born premature are at

[24] Centers for Disease Control and Prevention, "Preterm Birth," accessed March 5, 2019, https://www.cdc.gov/reproductivehealth/MaternalInfantHealth/PretermBirth.htm.

[25] Joyce A. Martin, *et al.*, "Births: Final Data for 2011," National Vital Statistics Reports, Vol. 62 (1) (June 28, 2013).

[26] C.N. Schoen, *et al.*, "Why the United States Preterm Birth Rate Is Declining," *American Journal of Obstetrics and Gynecology*, 213 (2) (Aug. 2015).

[27] World Health Organization, "Preterm Birth," accessed March 5, 2019, https://www.who.int/news-room/fact-sheets/detail/preterm-birth.

significant risk of neonatal death, complicated and prolonged stays in newborn intensive care units, respiratory distress, seizures, blindness, deafness, and feeding problems, and are at increased risk of chronic health problems. In 2006, preterm birth in the United States was estimated to cost approximately $31 billion per year.[28]

There was consensus among working group participants that the tool could have a profound impact and that the project was well worth pursuing. The greatest concern, however, was that the initial phases of *training* the machine learning algorithms (which would require tracking an initial group of at least 1,000 patients) and then *validating* the algorithms produced by that training (which would require tracking an additional 300 patients) would take at least five years, which is the normal timeframe in which CWP projects are supposed to have been implemented. Only at the end of that period would it be possible to develop the data visualization part of the tool, which would take what is learned from the algorithm and present it on a handheld device. In other words, the time allotted for CWP projects would only allow for the initial exploratory research and knowledge generation, and not its implementation and measurement. Furthermore, one participant underscored the importance of taking into account ethical considerations around collecting such information, with particular concern for patients' privacy and ensuring they understood how their data would be used before consenting to take part in the initial phases.

Continuing the Work of the Safe Motherhood Initiative in New York to Reduce Maternal Mortality & Morbidity: This project builds upon the Safe Motherhood Initiative (SMI), which in 2010 brought together obstetric leaders from hospitals around New York State to develop "bundles," or standardized protocols, to manage the three leading causes of maternal mortality and morbidity at the time: hemorrhage, hypertension, and venous thromboembolism.[29] When the initiative – which was administered by the American College of Obstetricians and Gynecologists (ACOG) District II office – started, New York ranked 46th in the nation for maternal mortality; by 2018, it ranked 30th. The project aims to continue to drive down the rates of maternal mortality and morbidity in New York by designing and implementing new clinical bundles to target maternal complications in two areas: sepsis and cardiac events. The project would also incorporate an education component on racial disparities and implicit bias, which would enhance the implementation of both new and pre-existing bundles. This component is particularly important, given the enduring racial disparities in the State with respect to maternal outcomes. In New York City, for example, non-Hispanic Black women are eight times more likely to die than White non-Hispanic women from pregnancy related causes.[30] The rollout and dissemination of the bundles would be complemented by site visits to

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[28] Aaron B. Caughey, *et al.*, "Clinical and Cost Impact Analysis of a Novel Prognostic Test for Early Detection of Preterm Birth," *AJP Reports* 6(4) (Oct. 2016).

[29] Safe Motherhood Initiative, "Safe Mother Initiative: 2013-2016 Final Report," https://www.acog.org/-/media/Districts/District-II/Public/SMI/v2/SMIFINALREPORT10192017Web.pdf?dmc=1&ts=20190305T2027147461.

[30] "De Blasio Administration Launches Comprehensive Plan to Reduce Maternal Deaths and Life-Threatening Complications from Childbirth Among Women of Color," *supra* note 11. This is an improvement over a New York City Department of Health and Mental Hygiene report, which indicated that black, non-Hispanic women were 12

New York-based hospitals with obstetric services, as well as improving an app that was developed during the first SMI, in order to make it more interactive and user-friendly. If proven effective, such bundles could be taken up and adapted by other states across the United States, with ACOG partners playing a leading role.

Participants recognized the benefits of being able to draw on SMI's existing infrastructure and relationships with hospitals, and of doctors and nurses feeling ownership for the local implementation, which would help ensure the project's sustainability. Participants agreed that in addition to assisting in the development of the protocols, the university's expertise would be particularly useful in strengthening the collection and analysis of high quality data regarding the specific challenges targeted by the bundles, as well as the impact had on maternal mortality and morbidity. Such data would be critical to understanding whether the safety bundles are working and improving outcomes. A key challenge in this realm, several participants said, is that hospitals are not good at collecting and sharing data regarding their patients, which can place additional administrative burdens on staff. Furthermore, it was suggested that it would be important to figure out ways to provide additional implementation support to hospitals that face the greatest challenges as a result of limited resources. To ensure broader uptake, it was suggested that SMI also seek to partner with other initiatives, such as collaborating with ACOG nationally.

Merck for Mothers' Safer Childbirth Cities Initiative – Proposals from Philadelphia, Pennsylvania and Laredo, Texas: The working group also considered two projects that had been proposed as part of the Merck for Mothers' Safer Childbirth Cities Initiative. For background on the initiative and Merck for Mothers, please see the summary of the Racial and Other Disparities Working Group, where two other projects proposed for this initiative were discussed.

The first proposal from the Safer Childbirth Cities Initiative that was discussed by the Systems Approaches working group came from the Philadelphia Maternal Mortality Review Team (MMRT). The team was convened by the city's Department of Public Health in 2010 in response to a sharp increase in pregnancy-related deaths in the city, and in 2015 it released a report that included recommendations for how to reduce such deaths. In Philadelphia, the poorest of the 10 largest cities in the United States, the pregnancy-related maternal mortality ratio is estimated to be 22 maternal deaths per 100,000 live births, and while Black, non-Hispanic women represent 44 percent of the city's population, they made up 73 percent of pregnancy-related deaths from 2010 to 2018. The MMRT proposed working with a range of partners to (i) strengthen surveillance and reporting of maternal mortality and morbidity; (ii) improve clinical care for women during the prenatal, intrapartum, and postpartum periods, through developing and implementing citywide management standards of care; (iii) provide

times more likely than white, non-Hispanic women to die from pregnancy-related causes between 2006 and 2010: New York City Department of Health and Mental Hygiene: Bureau of Maternal, Infant and Reproductive Health, "Pregnancy-Associated Mortality, New York City, 2006 – 2010," https://www1.nyc.gov/assets/doh/downloads/pdf/ms/pregnancy-associated-mortality-report.pdf.

training to address explicit and implicit biases experienced by minority women as they try to access health care; (iv) increase community-based support for women, through training community members to become doulas and breastfeeding peer counselors; and (v) educate and coordinate providers to support women who are experiencing or are at-risk for perinatal substance use disorder (the MMRT's reviews found that 45 percent of all maternal deaths from 2010 to 2018 had a history of behavioral health disorder, and 55 percent had experienced substance abuse before, during, and/or after pregnancy).

The second Safer Childbirth Cities Initiative proposal, The Laredo Integrated Health Care Model for Maternity Care, came from the Laredo, Texas offices of BCFS, a nonprofit health and human services organization, and focused on addressing health disparities among vulnerable Latino immigrants along the U.S.-Mexico border, through a mobile unit that brings integrated care to isolated communities. Webb County, where Laredo is located, has a population of around 275,000 people, 95.5 percent of the population is Hispanic or Latino and 90.3 percent speak a language other than English at home. Recent data suggest approximately 11.5 percent of pregnant women in the county do not receive any prenatal care, and 29.6 percent of pregnant women are obese. This project would focus on women who are living in *colonias* – rural neighborhoods within 150-miles of the border that lack adequate infrastructure or housing, as well as other basic services including roads, drinkable water, and sewer systems. The project would aim to address a number of obstacles that prevent pregnant and postpartum women from accessing care, primarily: (i) the lack of public transportation between the *colonias* and health services in Laredo; (ii) widespread poverty (31.8 percent of people in Webb County live in poverty, compared to 12.3 percent in the U.S.); (iii) the lack of health insurance (30.2 percent of people in the county don't have health insurance); and (iv) in an environment of increased immigration enforcement, the fear that accessing public services will place women and their families at risk. The main means of addressing these problems would be to deploy a mobile medical unit to travel to the *colonias* and nearby isolated towns – bringing medical services, trainings (such as health education classes and lactation courses), assistance in accessing other services, and case management to women who would otherwise not have access to such help. The mobile unit would also serve as a central hub connecting women to a range of other service providers in the area, depending on their individual needs.

In discussing the two Safer Childbirth Cities projects, participants noted the value of looking at the city as a unit for innovation and system-based approaches, given the capacity to integrate a range of actors across key sectors at a scale that is at once approachable and can have a significant impact. Participants pointed to the added value in being able to compare innovations and lessons learned across a range of cities, which could shed light on the way the efficacy of certain programs is influenced by different contexts. Such an initiative could also foster what one participant called "communities of practice," whereby practitioners from different cities can share ideas and experiences. Participants observed that both projects looked at interventions along a continuum of care – from before a woman is pregnant through to the postpartum period – and recognized the need to address the social determinants of health. Several participants noted the inherent paradox in trying to come up with effective ways to address challenges in maternal health. On the one hand, the drivers of poor outcomes are so

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multifactorial that they often cannot be remedied by a single, narrow intervention. And yet on the other hand, if and when systems-based interventions prove successful, their complex set of interventions make it hard to determine what constituent parts made a difference, versus those that did not. Participants noted that although there did not appear to be a specific element of research and scholarship that drove the design of these interventions, Columbia could play a role across the Safer Childbirth Cities in analyzing objectively the efficacy of the cities' efforts, in a way that is both rigorous and objective, and in particular highlighted the importance of careful data collection and analysis.

4. *Environmental Factors*

The environment can place profound strains on maternal health. Environmental stresses may come in the form of shocks, such as conflicts, outbreaks of disease, or severe weather events associated with climate change; or they may result from sustained environmental degradation and neglect, such as extreme levels of air pollution or toxic housing. Changes to a woman's community or lived environment – such as a move from rural to urban settings and reduced access to nutritious foods – are also environmental factors that can affect maternal health While such factors, most of which are man- and woman-made, can have a negative impact on the health of entire communities, they acutely affect women and girls, often resulting in a greater incidence of high-risk pregnancies and less access to high quality care.[31] These factors exacerbate the existing disparities in maternal health that are already experienced by the poor, adolescents, and groups that are subject to racial or ethnic discrimination, among other marginalized populations – groups that also face the greatest obstacles in advocating for improved access to quality care, and that tend to have less agency in improving their environments and changing their daily routines. While it is always the case that physical and psychological stresses during pregnancy can impact the health of an infant, a harmful environment may have lasting negative effects on children's cognitive and physical development. This working group focused on four projects aimed at increasing the resilience of pregnant and postpartum women in situations of heightened risk due to environmental factors, as well as how to shift the environment from a negative factor to a positive one in shaping maternal health.

<u>Sustaining Maternal Health in Urban West Africa</u>: Overweight and obesity rates are rising swiftly in lower-income countries, particularly among poor and less-educated women in urban parts of Africa. In Ghana, Kenya, Niger, Sierra Leone, Tanzania, and Zimbabwe, overweight and obesity prevalence among urban women is now almost 50 percent,[32] and recent studies show approximately 18 percent of pregnant women in Africa are obese in their first trimester. Obesity is associated with a significantly increased risk of several poor maternal outcomes,

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[31] Lori McDougall, *et al.*, "Executive Summary: Maternal Health 2016," *The Lancet* Vol. 388, No. 10056 (September 2016), https://www.thelancet.com/series/maternal-health-2016.

[32] Jaacks LM, *et al.*, "Programming maternal and child overweight and obesity in the context of undernutrition: current evidence and key considerations for low- and middle-income countries," *Public Health Nutrition* 20 (7) (May 2017).

including adverse labor outcomes (Caesarean section and instrumental delivery), pregnancy-induced hypertension, and hemorrhages, as well as an increased risk of macrosomia and the need for intensive care of the infant.[33] The first project proposed developing and implementing a program to prevent obesity, diabetes, and hypertension among women of reproductive age in low-to-moderate income neighborhoods in urban African settings, through a pilot program in Bamako, Mali. The project would develop a family-based intervention to be facilitated by community health workers (CHWs), adapting the evidence-based Diabetes Prevention Program (DPP) implemented by the Centers for Disease Control and Prevention in the United States. The Mali program would adopt a similar lifestyle and family-centered approach, combining a series of women's group sessions with individual meetings and follow-ups. A critical part of the program would be developing a context-specific toolkit for CHWs and women in Mali, which would be easy to understand and follow, and would propose dietary and behavioral changes that are culturally acceptable, cost neutral, and sustainable. The project would be implemented in collaboration with Mali's National Medical School, their national diabetes association, and government ministries for non-communicable diseases and maternal health. If proven successful, it is hoped that the program could be adapted for urban settings across Africa, where there is both need for and interest in addressing this growing problem.

Key issues and concerns raised by participants included: (i) whether the proposed age cohort for the feasibility study (age 35-59), would be too late of an intervention from a maternal health standpoint, and should be shifted to earlier in women's lives, perhaps to the age when women are likely to become mothers; (ii) whether women would continue to practice healthy lifestyles after the program ends, through pregnancies and beyond; (iii) whether the relevant Malian ministries would continue to allocate resources towards this program after the CWP project, given competing demands on their limited resources; (iv) the difficulty of measuring the program's impact beyond behavioral and weight changes, including the challenge of measuring progress toward reducing noncommunicable diseases within the five-year timeframe of CWP projects; and (v) the cultural norms that would need to be changed, such as the fact that in certain communities in the region, being overweight can be seen as a marker of health, affluence, or beauty. Participants suggested that the project should draw on digital technology as a means of informing the target population (whether CHWs or women) and keeping participants engaged.

Proper Referral of Maternal and Postnatal Treatment (PROMPT) in Rural Ghana – A Health Systems Approach to Improving Emergency Maternal and Newborn Care: The second project would take a systems-based approach to identifying and reducing three intervals in emergency maternal care in which delays commonly occur, significantly increasing a pregnant woman's risk of mortality and morbidity: (i) delays in seeking care; (ii) delays in reaching a facility; and

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[33] O.J. Onubi, *et al.*, "Maternal obesity in Africa: a systematic review and meta-analysis," *Journal of Public Health* (Oxford, England) 38 (3) (Sept. 2016).

(iii) delays in acquiring appropriate care at the facility[34] for most emergency obstetric and newborn care.[35] The proposed project would build upon two existing initiatives in Ghana: a recently-launched program to develop Acute Care and Emergency Referral Systems (ACERS), and a program to improve community-based primary care (CHPS+). While most resources invested in improving maternal health care focus on strengthening primary, secondary, and tertiary-level care, this project would instead focus on tracking the delays, communication failures, and other problems that arise as patients move between these levels of care, with the aim of more effectively directing them to the right provider, at the right time, and ensuring they receive the right care. The project would do this by creating data-driven referral and communication systems that are integrated across the Ghana's three health care levels, as well as by offering support to providers in making key decisions regarding when and where to send patients. In addition to providing feedback in real-time, the project would also seek to identify common problems within the system, and develop broad-based solutions to prevent them from recurring. The project would pilot this approach in Ghana's Northern Region and Volta Regions, in partnership with the key government ministries, NGOs, health providers, and academics engaged in the aforementioned health projects, as well as new partners.

In response, participants said it was difficult at times to distinguish between the role of PROMPT and that of the two existing health projects in Ghana upon which it would be layered, with one expert suggesting that a visual aid might help clarify the projects' distinct roles. Participants noted the problems identified in this project could be viewed as part of a broader social networking challenge, and thus recommended bringing in experts with knowledge of how to make such networks more efficient and accurate when it comes to information sharing and decision making. It was noted that other health systems have almost certainly grappled with similar types of problems, particularly with respect to emergency care, and participants suggested that previous studies and interventions be examined in advance to see if any valuable lessons might be learned. Finally, participants noted that the model as described seemed to focus almost entirely on temporal delays and poor communication, without acknowledging that some delay problems might be driven by the quality of care (or lack thereof). Participants questioned how the proposed project would distinguish deficiencies in the quality *within* the layers of the system from deficiencies in moving *between* those layers.

From Patients to Experts – Improving Maternal Health Outcomes by Unlocking Women's Voices in Their Own Care: The third project would seek to develop a comprehensive approach to amplifying women's voices and treating them as experts in their own maternal health. The

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[34] KJ Kerber *et al.*, "Continuum of care for maternal, newborn, and child health: from slogan to service delivery," *The Lancet*, Vol. 370, Issue 9595 (October 13, 2007).

[35] NJ Kassebaum, *et al.*, "Global, regional, and national levels of maternal mortality, 1990–2015: a systematic analysis for the global burden of disease study 2015," *The Lancet.* 388 (10053) (Oct. 8, 2016). ; Thaddeus S, Maine D. Too far to walk: Maternal mortality in context. Soc Sci Med. 1994;38(8):1091-1110. LA Chavane, *et al.*, "Maternal death and delays in accessing emergency obstetric care in Mozambique," *BMC Pregnancy and Childbirth*, 18(1) (March 2018).

project is aimed reducing situations where women do not feel they can share symptoms that concern them; and situations when women do share such symptoms, but health professionals do not listen or react appropriately. The holistic approach developed would then be piloted and adapted by Village Health Works (VHW), an NGO operating in rural Burundi, in a new women's hospital and teaching facility that it is planning to open in early 2020. Burundi ranks 185th out of 188 countries on the Human Development Index, and its maternal health statistics remain among the worst in sub-Saharan Africa,[36] where a woman's lifetime risk of dying in childbirth in Burundi is 1:23.[37] The project would aim to design, implement, and adapt a suite of approaches and shifts to the environment aimed at unlocking and responding to women's expert voices; seek to fully integrate the voice of women into a holistic approach to care; and support other facilities in Burundi, the region, and beyond to adopt approaches proven to be effective. The idea is that such an approach will not only enhance the dignity of self-worth of women, but also that save lives, reduce morbidity, and lead to cost-effective improvements in care. Among the areas where VHW would seek to unlock and amplify women's voices are rethinking the spatial features of clinical rooms; the interpersonal interactions with providers; accompaniment in clinical settings (such as integrating doulas and CHWs); and community outreach to engage women's partners.

Participants suggested that, given VHW's overall community-based approach and the long-term effort that will be required to change attitudes regarding the voice of women within communities, the work of amplifying a woman's voice will need to begin long before she arrives for her first prenatal appointment. Participants noted as a possible challenge that comes with all comprehensive approaches to changing problems: if the program succeeds in improving maternal outcomes, it will be difficult to identify which elements of VHW's intervention were essential to achieving change, and which were not.

Improving Maternal Health through Housing Policy Reform – Designing and Implementing New Models for Public-Private Investment in Housing Programs: This project would work with public and private housing developers to design, implement, and measure the impact of changes to affordable housing, including both physical improvements and the expansion of access to residentially-based programs and services. The objective would be to demonstrate that housing-based conditions contribute to persistent disparities in maternal health, and that those conditions can be modified in a cost-effective way to achieve a measurable improvement in maternal and infant outcomes. Housing presents a powerful vector on which to address maternal health, given that more than half of all public housing units in the United States are occupied by single-mothers, many of whom experience multiple social stressors and chronic health problems. Roughly 9.6 million women in the United States are caring for themselves and

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[36] UNICEF, "Maternal Mortality," accessed March 5, 2019, https://data.unicef.org/topic/maternal-health/maternal-mortality/.

[37] World Bank, "Lifetime risk of maternal death," accessed March 5, 2019, https://data.worldbank.org/indicator/SH.MMR.RISK.

their children on a single income.[38] The project would consist of two components. First, it would evaluate maternal health indicators at three distinct levels of housing quality (while controlling for cost, stability, and community context): (i) public housing (low rent, high toxicity, limited resident-based health and social services); (ii) Section 8 housing[39] (low rent, reduced toxicity and physical improvements, no resident-based services); and (iii) communities of opportunity (low rent, reduced toxicity, and physical improvements, as well as various resident-based health and social service interventions). Second, the project will seek to demonstrate how different housing-related interventions and services are associated with improved maternal health indicators, and seek to determine which of these interventions are most effective – and cost-effective – in improving maternal health.

Participants said that it would be extremely valuable to be able to demonstrate that reducing toxicity in affordable housing and investing in residentially-based programs not only improves maternal health, but is cost-effective (in Medicaid expenses saved, for example). Some participants questioned whether this was in fact a maternal health project, or rather a project focused on health outcomes more broadly; they also questioned whether the most important metric on which to select interventions in the affordable housing space should be improving maternal health, as opposed to other – potentially broader – outcomes. In response to a question as to how they would choose which interventions to test, the project's drafters said they would focus on options that were modifiable; would be appealing to residents (and thus be more likely to be adopted); and would yield a big return on investment in terms of maternal health outcomes.

5. *Adolescent Health and Preterm Birth*

When a young woman becomes pregnant before she is physically, developmentally, and socially ready, it can significantly alter the prospects for her life and that of her child, and in the direst cases can even result in death. Not only do adolescents have a higher risk than other mothers of maternal mortality and morbidity (including higher rates of eclampsia and infections), but the infants born to adolescent mothers also face higher health risks.[40] Adolescence is, moreover, a time of increased risk for both HIV and mental illness, and young mothers have heightened vulnerability to both, which substantially increases the risk of certain pregnancy-related

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[38] United States Census Bureau, "America's Families and Living Arrangements: 2017," Current Population Survey, 2017 Annual Social and Economic Supplement, U.S. Department of Commerce, https://www.census.gov/data/tables/2017/demo/families/cps-2017.html.

[39] Section 8 is a federally funded U.S. government program to assist low income households to find affordable housing. The U.S. Department of Housing and Urban Development (HUD) regulates the Section 8 program, while the local housing authority administers the program at the local level. With Section 8 housing, program beneficiaries pay 30 percent of rent costs, while the program covers the remaining cost in the form of housing vouchers.

[40] For example, compared with mothers age 20 to 24 years, adolescent mothers age 10 to 19 years have a higher risk of eclampsia, puerperal endometritis, systemic infections, low birthweight, preterm delivery and severe neonatal conditions. T. Ganchimeg *et al.*, "Pregnancy and childbirth outcomes among adolescent mothers: a World Health Organization multicountry study," *BJOG* 121 (March 2014), https://obgyn.onlinelibrary.wiley.com/doi/full/10.1111/1471-0528.12630.

complications. Adolescent childbearing is also associated with lower educational attainment and can perpetuate a cycle of poverty from one generation to the next. Nevertheless, every year an estimated 21 million adolescents from age 15 to 19, and 2 million girls under age 15, become pregnant. Moreover, although the global adolescent birth rate declined from 65 births per 1,000 women in 1990 to 47 births per 1,000 women in 2015, because the global population of adolescents continues to grow, projections indicate that the number of adolescent pregnancies will increase globally by 2030, with the greatest proportional increases in Africa. Perhaps not surprisingly, complications from pregnancy are the leading cause of death globally for adolescents age 15 to 19.[41]

Among the complications that adolescents are more susceptible to as compared to women age 20 to 24 is preterm births, which is defined as a live birth before 37 weeks of pregnancy. An estimated 15 million babies are born preterm every year, and the number is rising. Preterm births are the leading cause of death among children under the age of five, and babies born premature are at significant risk of respiratory distress, seizures, blindness, deafness, and feeding problems, among other adverse effects. Babies who are born premature also have a higher risk of chronic health problems including cardiovascular disease and dying young. For mothers, preterm births carry both physical risks and, research has demonstrated, significantly greater levels of stress and depression compared to women who deliver at term.[42] In addition to the obvious impact on the mother and child, preterm birth carries significant social and financial costs. In the United States alone, the cost of preterm births in 2006 was estimated at $31.5 billion.[43]

This working group considered four projects focused on addressing the challenges specific to adolescent maternal health care and preterm birth.

Precision Medicine Approach to Treatment of Preterm Birth: This project would aim to use electronic medical records (EMR) of women in the United States to identify clinical and demographic factors associated with preterm birth, and use machine learning to build a longitudinal prediction model capable of identifying women at a higher risk for spontaneous preterm birth (sPTB). Furthermore, the project would aim to leverage clinical profiles of women treated with progesterone – the only FDA-approved treatment to prevent sPTB in the United States – to identify subgroups of patients for whom the treatment is likely to be effective. (Progesterone treatment prevents recurrent sPTB in approximately one-third of cases, yet only a small percentage of women who are at high risk of sPTB – roughly 5 to 10

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[41] UNFPA, *The Maternal Health Thematic Fund: Keeping the Momentum (Annual Report 2017)*, May 2017, https://www.unfpa.org/sites/default/files/pub-pdf/UNFPA_PUB_2018_EN_MHTF_AnnualReport2017.pdf.

[42] Aud R. Misund, *et al.*, "Mental health in women experiencing preterm birth," *BMC Pregnancy and Childbirth* 14 (August 2014), https://bmcpregnancychildbirth.biomedcentral.com/articles/10.1186/1471-2393-14-263.

[43] "Clinical and Cost Impact Analysis of a Novel Prognostic Test for Early Detection of Preterm Birth," *supra* note 21.

percent – actually receive a prescription.[44]) The project would be led by a team of physicians, computer scientists and statisticians across the Columbia University Irving Medical Center (CUIMC) and the University of California, San Francisco (UCSF) that is uniquely positioned to analyze and integrate the large, diverse datasets presented in the context of preterm birth. The team would also work closely with the New York City and San Francisco Departments of Public Health, and the March of Dimes as community partners.

In the discussion, participants questioned why progesterone is rarely prescribed as treatment, given its relative efficacy in preventing recurrent sPTB. Is it a lack of insurance coverage, skepticism or lack of awareness on the part of providers, concerns around potential adverse effects, or some other factor? Participants said that understanding why progesterone is rarely prescribed and taken would be critical to determining whether this project is likely to result in a significant impact on sPTB. Participants recommended additional research on why progesterone is not prescribed more often, and then incorporating appropriate advocacy strategies aimed at overcoming barriers to prescription and treatment in the early stages of the proposed project.

<u>Interactive Tool to Support Contraceptive Decision-making Among Young Women in Humanitarian Settings</u>: This project aims to adapt an existing web-based, interactive decision-making tool that provides tailored contraceptive recommendations for young women age 15 to 24 in humanitarian settings. Roughly half of all individuals living in humanitarian settings, where they often lack access to sexual and reproductive health (SRH) services, are under 20 years old.[45] While use of effective contraception reduces unintended pregnancy – a leading cause of mortality and morbidity among young women, and in particular adolescents – women face significant barriers to obtaining and using contraception in humanitarian settings.[46] The proposed tool would make the complex process of choosing a contraceptive method easy, individualized, evidence-driven, and appealing to adolescents and young women. The tool would require no prior knowledge about contraceptive methods, could be used by women with limited health literacy and women who cannot read (using tablets with audio functionality), and would work off-line, given the limited connectivity in such settings. In addition to empowering young women with the knowledge to make informed contraceptive decisions, the tool would also (i) improve privacy and confidentiality for clients; (ii) decrease the potential for service-provider bias when interacting with young women seeking contraception; and (iii) improve patient flow in overstretched health facilities. Furthermore, what is learned through the tool about the broader preferences of young women could be used to improve the design and implementation of programs aimed at increasing access to contraception in humanitarian

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[44] CP Stewart, *et al.* "Preterm delivery but not intrauterine growth retardation is associated with young maternal age among primiparae in rural Nepal," *Maternal & Child Nutrition.* 3 (3) (July 2007), https://www.ncbi.nlm.nih.gov/pubmed/17539886.

[45] UNFPA, *The State of World Population 2015: Shelter from the Storm*, http://www.unfpa.org/sites/default/files/sowp/downloads/State_of_World_Population_2015_EN.pdf.

[46] V. Chandra-Mouli, *et al.*, "Contraception for adolescents in low and middle income countries: needs, barriers, and access," *Reproductive Health* 11 (1) (Jan. 2014), https://doi.org/10.1186/1742-4755-11-1.

settings. A proposed a second phase of the project would incorporate community engagement efforts to increase use of the tool. The project would initiate pilots in crisis-affected areas of the Democratic Republic of Congo, Somalia, and Niger or Yemen.

Participants agreed on the inherent value of trying to provide contraceptive guidance to this vulnerable group, and the importance of learning more about the preferences and the obstacles that adolescents face. Yet they questioned whether young women would be more likely to visit a health facility if they knew they would have access to such a tool rather than meeting with a provider. For example, might a visit to a facility be seen as a sign that a young woman was sexually active, and thus deter her from visiting? A participant suggested running a randomized control trial to test whether the availability of such a tool resulted in more or fewer young women going to facilities. Other participants asked whether community health workers or peers could be trained in how to use the tool, allowing them to take tablets and cell phones out of facilities to meet young women and adolescents where they are, which might increase use. Other questions and concerns included: (i) whether contraceptive providers might override the recommendations provided at the end of using the tool; (ii) how to keep data secure over the long periods of time that the tool is offline; (iii) whether the app could be adapted effectively and efficiently for use in different contexts; and (iv) how to ensure the tool will continue to be used beyond the timespan of the CWP project, especially if humanitarian providers using the tool leave the community. Participants also questioned whether aspects of this project might be combined with the group care project in Mozambique (below).

Healthy Motherhood for Young Mothers: Enhancing Maternal Health Among Adolescents in Mozambique: The third proposed project would use a group care approach to implement a multi-pronged, evidence-based set of interventions aimed at improving maternal health among adolescents in Mozambique. Mozambique has one of the highest maternal mortality rates in the world, with the highest incidence among adolescents; among girls age 12-14 in Mozambique, there are 1816 deaths per 100,000 live births. The project would bring together an interdisciplinary team to design, implement, and evaluate a package of adolescent-focused antenatal and postnatal medical services in order to build social support and foster empowerment of young women. It would include mental health screening, family planning, income-generating skills, and literacy and numeracy, and would be piloted in Nampula Province, the part of the country with the greatest number of adolescent pregnancies. The approach would build on a group model that has been shown to increase retention in antenatal care, improve maternal health and birth outcomes, and increase postpartum uptake of contraception among high-risk women in the United States; as well as a program that has been piloted by Columbia's ICAP program among postpartum women living with HIV in Kenya. The model would be adapted to meet the unique needs of adolescents living in Mozambique through collaboration with the Ministry of Health, and draw on existing infrastructure and field expertise in the province.

Among the key questions voiced by participants were: (i) the need to learn more about the target population of adolescents in Mozambique, including its characteristics, needs, and a more nuanced rationale for why adolescent women were being targeted rather than all women;

(ii) figuring out what the organizing principles would be for assigning adolescents to groups (by age cohort or mixed, by marital status, in or out of school, etc.), and perhaps measuring the efficacy of different approaches; (iii) whether family members, in particular men, should participate in the groups; and (iv) whether data collection might allow for the use of predictive analytics to target the most vulnerable mothers. Participants supported the project's theory of change – of providing a holistic bundle of services to address the diverse vulnerabilities and needs of pregnant adolescents.

<u>Maternal Health Among Conflict-Affected Women and Adolescents in Humanitarian Settings</u>: This project would pinpoint and address key structural and programmatic obstacles that contribute to adolescent maternal mortality and morbidity, namely poor access to contraception and safe abortion services among adolescents in humanitarian settings. The project proposes piloting a program in the Democratic Republic of Congo (DRC), which would then be adapted for use in a second country, with the aim of seeking to influence discourse and programmatic standards based on what is learned. The team would first assess the legal, service delivery, and civil society landscape for sexual and reproductive health (SRH) service access in the DRC, with particular attention to adolescents, contraception, and abortion. Second, the project would strengthen the public sector's capacity to provide SRH services. Third, it would seek to improve the legal, policy, and health systems framework for providing SRH services, including access to safe abortions under the law. Concurrently, in legally restrictive settings, the project would introduce harm-reduction strategies to help women with unintended pregnancies to use misoprostol to safely induce abortion. The project would then adapt these interventions for a second country – perhaps focusing on one with a more restrictive legal environment – in order to learn more about what strategies are transferable. Evidence gained through monitoring these interventions would provide the foundation for drafting new guidelines for humanitarian organizations, which could help ensure adolescents have access to these services across humanitarian settings.

Key issues and concerns raised by participants included: (i) whether the team's proposed collaboration with NGOs would be effective given many organizations' track record of not wanting to work on safe abortions (even when the law permits them), or misunderstanding and misapplying abortion law; (ii) whether the team planned to seek lessons learned from other contexts in which abortion law has been misinterpreted or has not translated into a change in access; and (iii) how the group planned to collect data from the project, given the stigma around abortion even among health care providers, and the difficulty of gathering metrics in unstable humanitarian settings. Participants also questioned whether aspects of this project might be combined with the group care project in Mozambique.

III. Conclusions and Project Selection

When participants reconvened in a plenary session, the five moderators reported out on the project ideas discussed in their respective working groups, describing the maternal health challenge each project would seek to address and the working group's assessment of its key

strengths and weaknesses. Participants then had the chance to ask follow-up questions about projects that had been discussed in other working groups.

Next, each participant was asked to identify the one or two projects that she or he thought most merited further development by CWP, with an eye towards eventual funding and implementation. Most participants noted how challenging it was, given the extraordinary quality of project ideas discussed, to prioritize among them. And while some participants were reluctant to identify only one or two projects, there was a clear wave of support among the experts for a few key projects. What also emerged in the final discussion was an interest in combining several project ideas with a focus on New York State, where Columbia could partner with others to model effective maternal healthcare; and for developing a project that would address vulnerable populations outside of the United States, given Columbia's extraordinary expertise in this arena. These three ideas were identified as having the greatest potential for impact, while also being plausible and thus best positioned for further development.

Effectively Expanding Medicaid to Cover Maternal Health: The idea that generated the most support among experts was a project focused on partnering with select U.S. jurisdictions to leverage Medicaid to cover pregnancy-related issues in the year after delivery, during which 60 percent of pregnancy-related deaths occur and one in six women experiences postpartum depression (among other significant pregnancy-related issues). Nearly half of all births in the United States are paid for by Medicaid, yet the program only guarantees coverage for mothers for 60 days after delivery, after which many new mothers go uninsured. While 31 states and the District of Columbia have expanded Medicaid to extend coverage beyond 60 days, there are wide discrepancies in who qualifies for the extension and what it covers. This project would involve several Columbia professors from diverse disciplines partnering with key jurisdictions, as well as entities within those jurisdictions, that have expanded Medicaid under the Affordable Care Act, in order to more effectively use the program to expand maternal health coverage and improve outcomes. Concurrently, the project would gather evidence of the adverse effects on women's health and gaps in coverage in jurisdictions that have not expanded Medicaid. The ultimate aim would be to design and test adaptations to Medicaid coverage for mothers in order to reduce pregnancy-related morbidity and mortality, improve maternal and infant outcomes, and reduce costs, which could be adapted by other jurisdictions across the country.

A Multifaceted Approach to Maternal Health in New York: This project is an amalgam of three ideas that were proposed at the Forum to address different aspects of maternal health in New York State. The idea to combine the three projects in a comprehensive intervention in New York was suggested by a participant in the closing plenary session, and drew significant support from other participants. Experts argued that Columbia's unique connections with the State, its experience implementing projects in New York, and the intrinsic value in addressing this challenge in the University's immediate vicinity all made this a compelling proposal. The project would bring together the following three interventions:

1. *Improve access to mental health care in New York during pregnancy and the postpartum period.*
   The project would create a model program at Columbia University Irving Medical

Center (CUIMC) for embedding mental health care into obstetrics primary care, in a way that is comprehensive, patient-centered, coordinated, and accessible. The model, which would allow patients to request behavioral health services from their first Ob/Gyn appointment, would aim to demonstrate that it is possible to improve outcomes for mothers and children while decreasing costs, ideally in coordination with insurance companies. At the same time, the project would establish a pair of centralized care coordinators for New York State, whose job it would be to field phone calls from Ob/Gyns across the State who request a psychiatric consult or a psychotherapy referral in the patient's location. These coordinators would increase screening for, and treatment of, behavioral health disorders during pregnancy and the postpartum period, and in some instances provide psychotherapy sessions through telemedicine.

2. *Expand and improve upon the Safe Motherhood Initiative (SMI)*, which has demonstrated significant progress in reducing the three main drivers of maternal mortality in New York, by developing and rolling out a systems toolkit to help providers from hospitals across the State reduce the next tier of major maternal complications. The program would draw upon the SMI model and network to generate and apply a new toolkit for sepsis and cardiac events, while also seeking to improve an online app that was designed to help providers at the bedside to apply the first SMI bundles and collect key information in real time.

3. *Address biases that contribute to enduring racial disparities in maternal health outcomes*, by developing and deploying a maternal health-specific implicit bias training course in the New York-Presbyterian hospital system, in addition to a broader set of activities designed to improve trust between health systems, providers, and women from vulnerable communities, in part by understanding the historical and social contexts in which they are experienced. The project would seek to develop a program aimed at tackling biases and fears through engaging pregnant women and mothers, community organizations, community health workers, and doulas. With each of these lines of effort, the aim would be to generate a model that could be applied beyond the state of New York.

A Group Care Approach to Improving Adolescent Maternal Health in Developing Countries: This project would use a group care approach to implement a multi-pronged, evidence-based set of interventions aimed at improving maternal health among adolescents in Mozambique and perhaps a second developing country. Mozambique has one of the highest maternal mortality rates in the world, and no group is more adversely affected than adolescents; among girls age 12 to 14 in Mozambique, there are 1816 deaths per 100,000 live births. The project would bring together an interdisciplinary team to design, implement, and evaluate a package of adolescent-focused antenatal and postnatal medical services. Those services would reach beyond clinical interventions to include mental health screenings, family planning and contraception, income-generating skills, and literacy and numeracy training. Among key attributes, the program would rely on adolescents to assist one another, from lending social support to carrying out physical examinations, as part of a more holistic

approach to fostering young women's empowerment. The intervention would build on a group care model that Columbia's ICAP program developed to provide postpartum care for women living with HIV/AIDS in Kenya. While the project was originally proposed solely in Mozambique, the value of adding a second site would be to determine whether parts of the model could be adapted across different contexts, and what parts might need to tailored to specific communities and circumstances.

Finally, it is worth noting that another project that received substantial support from the experts was the idea to develop a clinical-friendly, enhanced data analytics and visualization tool that would employ patient-specific ultrasound imaging and maternal health data (e.g., age, body mass index, race) to predict the onset of labor and assess the risk for obstetric complications at the individual level. The fact that it would not be possible to implement the project within five years, which is the timeline on which CWP projects are to be completed, was determinative. Consequently, CWP will work to facilitate this extraordinary and innovative idea through other means.

IV. Next Steps: Project Development, Assessment, and Implementation

In March 2019, the three project proposals that emerged from this Forum will be presented to the CWP Advisory Committee, whose role is to advise on whether project ideas coming out of the Forum meet CWP's criteria and merit further development as potential CWP projects.

Projects that are determined to merit further development will receive an initial tranche of funding to undergo a rigorous project design phase of approximately three or four months, during which the project leads will work with CWP staff to define major deliverables, a precise timeline for implementation, a funding plan, a set of performance indicators for monitoring and evaluation, and the key implementing partners – all of which will be synthesized in a project design report. CWP staff will then prepare an evaluation of this plan, which will be combined with the project design plan and shared with Columbia President Lee C. Bollinger and the CWP President's Council for final consideration.

V. Acknowledgements

A number of people helped conceive of, organize, and shape the CWP Forum on Maternal Health, to whom we are profoundly grateful.

First, we thank the many individuals who gave generously of their time in advance of the Forum, informing our understanding of the challenge, helping develop ideas for specific projects, and suggesting potential partners for implementation. They include (unless otherwise noted, the academic institution with which individuals are affiliated is Columbia University): Anshu Banerjee, World Health Organization; Craig Brammer, Network for Regional Healthcare Improvement; Marley Bauce, Manager of Research Initiatives

VI. Annex: Biographies of Forum Participants

Lee C. Bollinger
President, Columbia University

Lee C. Bollinger became Columbia University's nineteenth president in 2002. Under his leadership, Columbia stands again at the very top rank of great research universities, distinguished by comprehensive academic excellence, historic institutional development, an innovative and sustainable approach to global engagement, and unprecedented levels of alumni involvement and financial stability. President Bollinger is Columbia's first Seth Low Professor of the University, a member of the Columbia Law School faculty, and one of the country's foremost First Amendment scholars. As president of the University of Michigan, Bollinger led the school's historic litigation in *Grutter v. Bollinger* and *Gratz v. Bollinger*. These Supreme Court decisions that upheld and clarified the importance of diversity as a compelling justification for affirmative action in higher education were reaffirmed in the Court's 2016 ruling in *Fisher v. University of Texas*. As Columbia's president, Bollinger conceived and led the University's most ambitious expansion in over a century with the creation of the Manhattanville campus in West Harlem. An historic community benefits agreement emerging from the city and state review process for the new campus provides Columbia's local neighborhoods with decades of investment in the community's health, education, and economic growth.

Elaine Abrams
Senior Director for Research, ICAP at Columbia University

An internationally recognized expert and clinician, Dr. Elaine Abrams has over 30 years of experience in comprehensive care and treatment for HIV-infected pregnant women, children and their families. As the senior director for research at ICAP, Abrams leads ICAP's large research agenda and is responsible for development and implementation of technical assistance, drug access, pediatric and perinatal prevention initiatives for ICAP programs in sub-Saharan Africa and Asia. Abrams was the director of the MTCT-Plus Initiative, the first multi-country family-focused HIV treatment program that demonstrated successful provision of HIV care and antiretroviral treatment for pregnant women and their families in resource-limited settings. Abrams built on this work by ensuring that ICAP's global portfolio and projects in over 20 countries were informed by and integrated the latest scientific breakthroughs in HIV in a way that was tailored to the specific needs and context of each country. Abrams currently serves as the co-chair of the guidelines group for WHO – Consolidated Guidelines for the Use of Antiretroviral Drugs for Treating and Preventing HIV Infection – and has been actively involved in the development of international, national, and local guidelines and policies for HIV care and treatment. Abrams' research interests have focused on maternal health, mother-to-child HIV transmission, the natural history of pediatric HIV, and optimizing antiretroviral therapy for infants, children, adolescents, and pregnant and breastfeeding women. Abrams is a professor of epidemiology and pediatrics at Columbia University and holds a medical degree from Columbia University's College of Physicians and Surgeons.

Angela Aina
Co-Director and Research Lead, Black Mamas Matter Alliance

Angela Doyinsola Aina, MPH is the Co-Director and Research Lead for the Black Mamas Matter Alliance. Aina has over 14 years of public health experience, working in different capacities on projects focused on: incorporating health equity strategies into reproductive and maternal health initiatives; strengthening strategic planning and community-based workforce development; and conducting research. Aina holds a Master of Public Health degree in International and Women's Health from Morehouse School of Medicine, where she conducted a sequential mixed-method analysis of the reproductive health attitudes and behaviors of Nigerian-born immigrant women in the U.S., and a Bachelor of Science degree from Georgia State University in Psychology and African-American Studies. Aina's expertise and perspectives on black maternal health has been featured in media outlets such as the Huffington Post, The Atlantic, the Root, and HLN/CNN. Aina is passionate about and committed to work that seek to achieve: the self-determination of women of African descent; the elimination of violence against women; the promotion of Black and African women's rights and leadership; and womanist solutions to social and economic injustices. In her spare time, Aina enjoys singing, dancing, sewing, and dabbling in all things science fiction and fantasy.

Heidi L. Allen
Associate Professor, Columbia School of Social Work

Associate Professor Heidi L. Allen is one of the co-investigators in the Oregon Health Insurance Experiment, the first randomized trial to examine the impacts of a health insurance expansion on uninsured adults in the United States. She joined with researchers from the Harvard School of Public Health, MIT, and the National Bureau of Economic Research in reporting the findings of this study nationwide, advising states on the costs and benefits of Medicaid expansion and suggesting ways to improve the quality of care delivered to low-income enrollees both through Medicaid and through the new health insurance exchanges. Allen previously served as a research scientist with Providence's Center for Outcomes Research and Education and as an adjunct assistant professor in the School of Social Work at Portland State University. She has five years of clinical social work practice in mental health and emergency departments and has served in a variety of positions related to setting health policy for the State of Oregon, including a work group on metrics appointed by Governor John Kitzhaber. She has taught graduate-level social work courses on health policy and practice, diversity and social justice, and human behavior and the social environment, along with sociology courses on drugs and alcohol and health inequality. Dr. Allen holds a BS in Psychology from Boise State University, an MSW from Portland State University, and a PhD in Social Work and Social Research from Portland State University.

Michael Leslie Amilcar
CEO, Cook Ross Inc.

Michael Leslie Amilcar is the CEO of Cook Ross Inc., a consulting firm based in Silver Spring, Maryland specializing in diversity, inclusion, leadership development, and organizational change management. In her role, Amilcar leads the company's strategic direction in pursuit of its mission to create inclusive workplaces in which persons of all backgrounds are able to contribute their talents and ideas fully. Driven by a passion to bring about social change in the world, Amilcar's 20-year career includes roles at AXA Financial, NBC Television, Magic Johnson Enterprises, and Diversity Best Practices all of which embraced diversity and inclusion best practices at their core. A native of Chicago, Amilcar earned her degree in Psychology from the University of Illinois Champaign-Urbana and later became a trained Transformative Coach. Wife, mom, entrepreneur, activist, adoptive family advocate, and self-proclaimed change agent, Amilcar currently lives in Kensington, Maryland with her husband Johnny and two young sons, Che and Tyson.

Erin Anastasi
Coordinator, Campaign to End Fistula; Technical Specialist, Sexual & Reproductive Health-Fistula, UNFPA

Erin Anastasi's extensive career in maternal/newborn health and human rights spans projects in Africa, Asia, Latin America, Europe, and the United States. She rose from Technical Specialist, Obstetric Fistula at UNFPA's Maternal Health Thematic Fund to her current role leading the global Campaign to End Fistula in 2014. Anastasi holds a Doctor of Public Health (DrPH) degree from the London School of Hygiene & Tropical Medicine and a Master of Health Sciences degree from the Johns Hopkins University School of Public Health. In 2017, she received the Women's Empowerment Award from the United Nations Federal Credit Union (UNFCU Foundation) in recognition of her leadership of the Campaign to End Fistula and her efforts to bring the voices of marginalized and vulnerable women to the table. Her other honors include a Fulbright Scholarship with the Grameen Bank in Bangladesh.

Ann Blanc
Vice President, Social and Behavioral Science Research, Population Council

Ann Blanc, PhD is Vice President of Social and Behavioral Science Research at the Population Council. Under her leadership the Population Council is increasing investments into rigorous research on maternal health, girls' education, stigma and gender inequality in HIV/AIDS, and the scaling up of evidence-based programs for adolescent girls. Before joining the Council in 2011, Blanc was director of the Maternal Health Task Force. Blanc is a member of the Committee on Population of the National Academy of Sciences, Chair of the Editorial Board of the Council's Journal Studies in Family Planning and a member of the "Core Group" of technical experts working on improving the measurement of coverage of maternal, newborn, and child health interventions.

Jeanne Brooks-Gunn
Virginia & Leonard Marx Professor of Child Development &
Education, Teachers College; Columbia University Professor of
Pediatrics, College of Physicians and Surgeons; Columbia University
Co-director, National Center for Children and Families, Teachers
College

Brooks-Gunn directs the National Center for Children and Families, which focuses on policy research on children and families, at Columbia University (www.policyforchildren.org). A life span developmental psychologist, she is interested in how lives unfold over time and factors that contribute to well-being across childhood, adolescence, and adulthood. She conducts long run studies beginning when mothers are pregnant or have just given birth of a child, sometimes following these families for 30 years. Other studies follow families in different types of neighborhoods and housing. In addition, she designs and evaluates intervention programs for children and parents (home visiting programs for pregnant women or new parents, early childhood education programs for toddlers and preschoolers, two generation programs for young children and their parents, and after school programs for older children). She is the author of several books including *Adolescent Mothers in Later Life*; *Consequences of Growing up Poor*; and *Neighborhood Poverty: Context and Consequences for Children*. She has been elected into both the National Academy of Medicine and the National Academy of Education, and she has received lifetime achievement awards from the Society for Research in Child Development, American Academy of Political and Social Science, the American Psychological Society, American Psychological Association and Society for Research on Adolescence. She holds an honorary doctorate from Northwestern University and the distinguished alumni award from the Harvard University Graduate School of Education.

Sara Casey
Director, RAISE Initiative; Assistant Professor, Heilbrunn Department of Population and Family Health, Columbia University

Dr. Sara Casey, Assistant Professor, focuses on using sound data collection and analysis to improve the availability and quality of sexual and reproductive health services in countries whose health systems have been weakened by war or natural disaster. Casey is Director of the Reproductive Health Access, Information and Services in Emergencies (RAISE) Initiative, a global program collaborating with program partners to identify and respond to challenges to improve contraceptive and abortion-related services in humanitarian settings in Africa and Asia. She provides technical guidance to partners to establish program monitoring and evaluation systems and conduct health facility assessments, population-based surveys and other implementation research. Casey received her Doctor of Public Health, Master of Public Health and Master of International Affairs degrees from Columbia University.

Christa Christakis
Executive Director, American College of Obstetricians and Gynecologists, District II

Christa Christakis is the Executive Director of the American College of Obstetricians and Gynecologists, District II, a non-profit organization representing board certified physicians who practice obstetrics and gynecology. Christakis is responsible for all office administrative and financial functions of the District II office, specializing in membership, medical education, communications and legislative relations. Prior to joining ACOG, Christakis served as the Senior Director of Quality and Research Initiatives at the Healthcare Association of New York State (HANYS), where she formulated the advocacy agenda and strategies for quality-related regulatory and legislative initiatives that impact HANYS' member institutions. Prior to joining HANYS, Christakis served as the Director of Government Affairs for ACOG District II. She has served on several community boards, including most recently as Chair of the Upper Hudson Planned Parenthood Board of Directors. Christakis received her Masters of Arts in Public Affairs and Policy (MPP) from the University at Albany's Rockefeller College of Public Affairs and Policy.

Cathryn Christensen
Clinical Partnerships Director, Village Health Works

Cathryn Christensen is a family physician and the Clinical Partnerships Director of Village Health Works in Burundi. Christensen's clinical and public health work focuses on community-based care models; human rights; the intersection of health with food security, education, economic development and the arts; and the support and training of clinicians in low-resource settings. Christensen completed her medical training at Harvard Medical School and the Santa Rosa-USCF Family Medicine Residency. She received her MPH from the Johns Hopkins Bloomberg School of Public Health, where she was a Sommer Scholar.

Mary D'Alton
Obstetrician and Gynecologist-in-Chief and Chair of the Department of Obstetrics and Gynecology, NewYork-Presbyterian/Columbia University Irving Medical Center; Willard C. Rappleye Professor of Obstetrics and Gynecology, Columbia University Vagelos College of Physicians and Surgeons
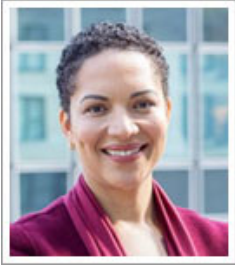
Mary D'Alton, MD specializes in high-risk Maternal-Fetal Medicine, with the majority of her practice focusing on patients with high-risk pregnancies due to complex maternal or fetal conditions. At NYP/CUIMC, she has implemented a multidisciplinary, coordinated approach to manage the highest risk pregnancies at the Carmen and John Thain Center for Prenatal Pediatrics, which opened in 2010, and the Mothers Center, which opened in May 2018. As Chair of the Department of Ob/Gyn at NYP/CUIMC, she has worked to fill the gaps in women's health by building and strengthening programs in infertility, minimally invasive gynecologic surgery, family planning, gynecologic oncology, and integrated women's health care. Serving as co-chair of the American College of Obstetricians and Gynecologists District II Safe Motherhood Initiative since 2013, D'Alton has led efforts locally and nationally to raise awareness about maternal mortality and morbidity and improve maternal outcomes. D'Alton's work to advance education, research, clinical practice, and policy development in women's health has won national recognition. In 2013, D'Alton was elected as a member to the National Academy of Medicine (formerly the Institute of Medicine).

Jamie Daw
Assistant Professor, Health Policy and Management, Columbia University Mailman School of Public Health

Dr. Daw studies how policies affect the barriers faced by populations in accessing needed health services, from gaining health insurance to connecting with providers and ultimately, receiving high-quality care. Her recent work focuses on the impact of state and federal policies on access to care for women and families in the period surrounding childbirth. Daw also studies prescription drug coverage policy and access to medicines in the U.S., Canada, and other developed countries. Her work has been published in leading medical, health services, and policy research journals including *JAMA, CMAJ, Obstetrics & Gynecology, Health Affairs*, and the *Journal of Health Policy, Politics and Law.*

Mary Ann Etiebet
Lead and Executive Director, Merck for Mothers

Etiebet has two decades of experience improving healthcare outcomes for vulnerable populations and transforming healthcare delivery at the frontlines. As the Lead and Executive Director of Merck for Mothers, Etiebet is responsible for successfully implementing a robust set of innovative maternal health programs and high-impact partnerships that integrate the private sector's invention and expertise to design, deploy, and scale solutions that empower women, equip health providers, and strengthen health systems. She draws on extensive U.S. and global experience in the private, public and not-for-profit sectors for this role. Prior to Merck for Mothers, Etiebet was a Principal Consultant in the Population Health Management team at Premier Inc. She has also served as Director of Ambulatory Care Strategies for New York City Health and Hospitals; Senior Clinical Technical Advisor for the Institute of Human Virology-Nigeria, a PEPFAR implementing partner; and Assistant Professor, Division of Infectious Disease at the University of Maryland School of Medicine. Etiebet earned her MD and MBA from Yale University. She completed her residency in Internal Medicine at New York-Presbyterian Weill Cornell and fellowship in Infectious Diseases Hospital System at New York-Presbyterian Columbia University Medical Center and is Board Certified in Infectious Diseases.

Sally Findley
Professor, Population and Family Health and Sociomedical Sciences, Columbia University Mailman School of Public Health

Findley focuses on community health, and specifically on promoting healthy communities and healthy children through multi-pronged intervention involving community health workers (CHW). She is one of those rare faculty whose research is in NYC and in Africa. In Northern Nigeria, Burkina Faso, Ghana, Mali, and Ivory Coast, she has worked with national and sub-national teams to use implementation research to identify the most effective strategies for incorporating CHW into integrated programs to reduce maternal, newborn, and child mortality, as well as to improve the prevention of chronic diseases. In New York, she has led two major child health promotion coalitions which have integrated community health promotion into routine social service and educational activities, along with piloting an adaptation of the Diabetes Prevention Program for CHW to incorporate into a diabetes management program for Dominicans. She has co-led the NY initiative to develop recommendations for New York's CHW scope of work, training, credentialing, and financing. She led a statewide assessment of the impact of 2009 changes to the Special Supplemental Nutrition program for Women, Infants and Children (WIC) program on early childhood obesity. Findley is a global migration researcher and has published extensively on migration and urban development policies, including the author or editor of four books focusing on migration, vulnerability, and health. She was a residential scholar at the Rockefeller Foundation Bellagio Center, which enabled her to complete her latest book, *Bridging the Gap: How Community Health Workers Promote the Health of Immigrants* (2015, Oxford University Press).

Lynn Freedman
Professor, Population and Family Health, Columbia University Mailman School of Public Health

Freedman directs the Mailman School's Averting Maternal Death and Disability (AMDD) Program, a global program of research, policy analysis, and technical support that, since 1999, has worked with UN agencies, NGOs, and governments in more than 50 countries in Asia, Africa, and Latin America, and in the United States, to reduce maternal mortality. Before joining the faculty at Columbia University in 1990, Freedman worked as a practicing attorney in New York City. Freedman has published widely on issues of maternal mortality and on health and human rights, with a particular focus on gender and women's health. Freedman also serves on the advisory boards of maternal health projects and human rights projects with programs in Asia, Sub-Saharan Africa and Latin America. Freedman received a law degree (JD) from Harvard University, a Masters of Public Health (MPH) from Columbia University, and a bachelor's degree (BA) from Yale University.

Avril Haines
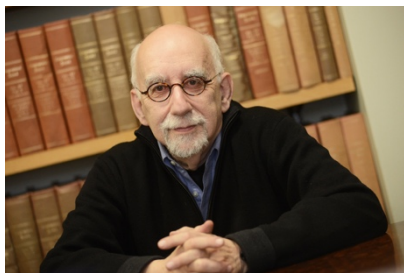*Senior Research Scholar, Columbia University*

Avril D. Haines is currently a Senior Research Scholar at Columbia University and a Lecturer in Law at Columbia University Law School. She served as Deputy National Security Advisor to President Obama, was the Deputy Director of the Central Intelligence Agency, and served as the Legal Adviser to the National Security Council. Before joining the NSC, she led the Treaty office at the Department of State, was the Deputy Chief Counsel for the United States Senate Committee on Foreign Relations, worked for The Hague Conference on Private International Law, and served as a law clerk for Judge Danny Boggs on the U.S. Court of Appeals for the Sixth Circuit. Haines received a bachelor's degree in Physics from the University of Chicago, a law degree from Georgetown University Law Center, and founded and ran a bookstore café for five years while engaged in community service in Baltimore.

Ira Hillman
Parenting & Early Childhood, Einhorn Family Charitable Trust

Ira Hillman leads the parenting and early childhood portfolio for the Einhorn Family Charitable Trust (EFCT), whose mission is to help people get along better. EFCT partners with nonprofits who share our vision for building strong parent-child relationships and nurturing environments that foster social and emotional development among young children. EFCT's longest and deepest partnership has been with the Nurture Science Program at Columbia University Medical Center. Hillman also leads a funder collaborative, Pediatrics Supporting Parents, that seeks to leverage the pediatric well-visit setting in order to optimize social and emotional development of children and strengthen parent-child bond. While EFCT's primary focus in early childhood is supporting parents with evidence-based strategies to help them maintain a strong and positive emotional connection with their children, they also partner with organizations who are: supporting the improvements of early learning environments by embedding social and emotional learning practices for preschool age children; finding opportunities for parents to build relationships with other parents of different backgrounds, recognizing that "parenting" is a shared experience; and supporting parents beyond the early childhood years to maintain nurturing relationships and environments through all the stages of their children's development. Prior to joining the Trust, Hillman spent more than two decades in the nonprofit sector, working with organizations in health care, the arts, higher education, and advocacy to transform their operations, develop new strategies, and build stronger collaborations among stakeholder groups.

Ira Katznelson
***Ruggles Professor of Political Science and History,
Columbia University***

Ira Katznelson is Ruggles Professor of Political Science and History at Columbia University. His 2013 *Fear Itself: The New Deal and the Origins of Our Time* has been awarded the Bancroft Prize in History and the Woodrow Wilson Foundation Award in Political Science. Other books include the just-published *Southern Nation: Congress and White Supremacy After Reconstruction* (co-authored with David Bateman and John Lapinski). Katznelson is a former president both of the American Political Science Association and the Social Science Research Council. He earned his BA at Columbia College and his PhD in History at the University of Cambridge, where he served in 2017-18 as Pitt Professor of American History and Institutions.

Nicholas Lemann
Director, Columbia World Projects; Director, Columbia Global Reports; Joseph Pulitzer II and Edith Pulitzer Moore Professor of Journalism; Dean Emeritus of the Faculty of Journalism

Nicholas Lemann directs Columbia World Projects. He also directs Columbia Global Reports, a book publishing venture that presents reporting around the globe on a wide range of political, financial, scientific, and cultural topics. Lemann is Dean Emeritus and Pulitzer Moore Professor of Journalism at Columbia. During his deanship, the Journalism School completed its first capital fundraising campaign, started its first new professional degree program since the 1930s, and launched significant initiatives in investigative reporting, digital journalism, and executive leadership for news organizations. Board memberships include Columbia's Knight First Amendment Institute and the Russell Sage Foundation. Lemann is a member of the New York Institute for the Humanities and the American Academy of Arts and Sciences, and a staff writer for *The New Yorker*.

Catherine Monk
Professor of Medical Psychology in the Departments of Obstetrics & Gynecology and Psychiatry; Director of Research at the Women's Program; Co-Director of the Domestic Violence Initiative, Columbia University Medical Center; Research Scientist VI at the New York State Psychiatric Institute

Originally trained as a clinical psychologist, in 2000 Monk completed her postdoctoral research studies in the Psychobiological Sciences at Columbia University via a National Institutes of Health (NIH) fellowship, joining the faculty at Columbia a year later. Monk's research brings together the fields of perinatal psychiatry, developmental psychobiology, and neuroscience to focus on improving women's well-being during pregnancy, as well as the earliest influences on children's developmental trajectories – those that happen in utero to affect child outcomes. Monk is internationally recognized for her contributions to the Developmental Origins of Health and Disease Research model, as they relate to prenatal exposure to maternal stress and depression: in addition to shared genes and the postnatal environment, there is a third pathway for the familial inheritance of mental illness – factors in the prenatal environment. Most relevant to the CWP Forum on Maternal Health, she currently directs a NIH-NICHD-funded intervention study based on a novel protocol that she and colleagues developed – harnessing the child focus of the peripartum period, parenting skills, and CBT to help women at risk for depression. It is called: *Preventing Postpartum Depression: A Dyadic Approach Adjunctive to Obstetric Care.* Her research has been continuously funded by the NIH since her first support as a NIH 'K' Career Development Awardee in 2001 as well as by the March of Dimes, NARSAD, the Robin Hood Foundation, and Johnson & Johnson.

Renee Montagne
Special Correspondent and Host, NPR News

After 13 years as cohost of the flagship news magazine "Morning Edition," Montagne joined NPR's Investigative Unit to collaborate with ProPublica reporter Nina Martin on the investigative series, "Lost Mothers." The series helped launch a national conversation on what had previously been a hidden public health crisis: American mothers dying or nearly dying at rates far above those of all other affluent nations. It also spotlighted another dire statistic: Black mothers die at more than three times the rate of white mothers. This in-depth series earned nearly every major award in the U.S. – including a Peabody, a Polk, and a finalist for a Pulitzer Prize. Early in her long career at NPR, Montagne cohosted All Things Considered with Robert Siegel. In the 90's, she covered the release of Nelson Mandela in South Africa, and was based there until his inauguration four years later. She travelled to Afghanistan after 9/11 and returned ten more times to report on the war and the Afghans caught up in it. Born in California, she graduated Phi Beta Kappa from University of California, Berkeley.

Allisyn Moran
Scientist at the World Health Organization (WHO) in the Department of Maternal, Newborn, Child and Adolescent Health (MCA) on the Epidemiology, Monitoring and Evaluation team in Geneva, Switzerland

Moran is working on measurement, monitoring, and evaluation of maternal and newborn health. She has over twenty years of experience in applied and operations research, program monitoring and evaluation, and translation of research findings to policy initiatives in reproductive, maternal, newborn, and child health. Prior to joining WHO in Geneva in 2017, Moran has worked with the Bureau for Global Health at USAID/Washington and USAID/Nigeria, Save the Children, JHPIEGO, iccdr,b and Johns Hopkins School of Public Health. Moran has a Doctor of Philosophy and a Masters in Health Sciences from Johns Hopkins University, where she focused on researching women's access to and use of health services in low- and middle-income countries and international public health. She has extensive field experience in over 15 countries worldwide including long-term residence and work in Bangladesh, Nigeria, and Morocco.

Rachel Moresky
Associate Professor of Public Health, Heilbrunn Population and Family Health, Columbia University Mailman School of Public Health and Associate Professor of Emergency Medicine, Emergency Medicine Department, Columbia College of Physicians and Surgeons

Over the past 20 years, Moresky has collaborated with governments and local institutions to improve emergency care systems in resource-limited settings through technical assistance, implementation support and science, cascading capacity building, and national policy development. In 2004, Moresky founded the sidHARTe - Strengthening Emergency Systems Program, which has been working in Rwanda on the CDC and Global Fund supported Human Resource for Health Program; GE Foundation on decentralized complex adaptive emergency care systems development. In Ghana, sidHARTe is working on a USAID supported Acute Care and Emergency Referral Systems (ACERS) Project to decrease rural maternal and perinatal morbidity and mortality in rural areas. Moresky's engineering, emergency medicine, and public health expertise has driven her work on complex adaptive emergency care systems research in sub-Saharan Africa, Southeast Asia, and Eastern Europe. In 2006, Moresky founded the Columbia University Emergency Medicine Fellowship at NewYork-Presbyterian, Emergency Department and mentors fellows on humanitarian action and health systems' research. Through sidHARTe and the Fellowship Moresky has collaborated and implemented projects with governments, WHO, CDC, USAID, MSF, IRC, and other NGOs. Moresky completed Engineering at Brown University, an Emergency Medicine Residency at University of Illinois at Chicago and a MPH and Fellowship in International Emergency Medicine at Harvard University, Brigham and Women's Hospital. Moresky holds an honorary appointment at the University of Rwanda - College of Medicine and Health Sciences.

Maylott Mulugeta
Health Manager, United Way of Greater Atlanta

Mulugeta was born and raised in metro Atlanta and grew up in a large immigrant family. She graduated from the University of North Carolina at Chapel Hill with a Bachelor of Science degree in public health and a minor in applied social and economic justice. Following graduation, Maylott taught 6th grade social studies at Title I schools for two years in Memphis, Tennessee. She moved back to Atlanta in 2015 and worked alongside Southern organizers at SPARK Reproductive Justice NOW fighting for and with women of color and LGBTQI folks for reproductive freedom. Maylott currently works as the Health Manager in the community engagement department at the United Way of Greater Atlanta. In this current role, she oversees both the CHOICE Neighborhoods and AmeriCorps federal grants, manages the organization's women's health portfolio, and supports in grant-making and technical assistance for over 40 health partners in 13 metro Atlanta counties. Maylott is also currently pursuing her Master of Public Health degree at Georgia State University – focusing on health behavior, education, and program evaluation research.

Kristin Myers
Associate Professor, Department of Mechanical Engineering, Columbia University

Myers area of expertise is in understanding the structural and material behavior of biological soft tissues with a specific focus on the female reproductive system and the biomechanics of pregnancy. Myers' research utilizes experimental, theoretical, and computational mechanics to calculate, visualize, and study the loading environment of pregnancy and postpartum recovery. In collaboration with Columbia's Department of Obstetrics and Gynecology, her ultimate research goals are to understand the causes of preterm birth and to provide a computational tool to clinically diagnose and guide treatment for the prevention of preterm birth. Myers received her Mechanical Engineering doctorate and master's degree from MIT and her bachelor's degree from the University of Michigan. In 2015 Myers was awarded the National Science Foundation CAREER award to develop the framework to model hormone-mediated tissue growth and remodeling of the uterine cervix during pregnancy, and in 2017 she was awarded the American Society of Mechanical Engineers Y.C. Fung Young Investigators award for her contributions to the field of biomechanics.

Herminia Palacio
Deputy Mayor for Health and Human Services, City of New York

Appointed Deputy Mayor for Health and Human Services in January 2016, Palacio is in charge of coordinating transformation efforts across the City's public health and healthcare system, expanding access to social services, and ensuring that agencies serving the City's most vulnerable populations are run compassionately, equitably, and effectively. In her role as Deputy Mayor, Palacio oversees 11 City agencies and mayoral offices entrusted with the responsibility of protecting the health and wellbeing of all New Yorkers. She entered this role with 25 years of experience across a broad range of sectors, including academic and clinical medicine, governmental public health, and philanthropy. Palacio most recently served as Director of Advancing Change Leadership at the Robert Wood Johnson Foundation (RWJF), where she was responsible for developing and implementing new health leadership programs. Prior to joining RWJF, she served 10 years as Executive Director of Public Health and Environmental Services in Harris County, Texas. Palacio received her medical degree from Mount Sinai School of Medicine, a Master of Public Health from the University of California at Berkeley School of Public Health, and a BA in biology from Barnard College at Columbia University. She has authored numerous articles in peer-reviewed scientific journals.

Kenneth Prewitt
Carnegie Professor of Public Affairs, Columbia University; Special Advisor to the President

Kenneth Prewitt is the Carnegie Professor of Public Affairs at SIPA and an Advisor to the President of Columbia University. Prewitt holds a PhD. from Stanford, and then served on the faculty at the University of Chicago for 15 years, where he was also Director of NORC. His other previous positions include: Director of the United States Census Bureau, President of the Social Science Research Council, and Senior Vice President of the Rockefeller Foundation. He is active in various professional organizations, including currently serving as the President of the American Academy of Political & Social Science.

Virginia Rauh
Professor and Vice Chair, Heilbrunn Department of Population & Family Health, Columbia University

Rauh is a developmental epidemiologist (Harvard School of Public Health, ScD) and social worker (Smith College School for Social Work, MSW) by training, whose work focuses on the long-term health effects of toxic social and physical environmental exposures, particularly with respect to socioeconomically disadvantaged and minority populations. Grounded in neuroscience, Rauh has studied the combination of exposure to social and physical stressors, including adverse childhood experiences, the built environment, and specific chemical hazards (tobacco smoke, pesticides, and air pollutants) on pregnancy, maternal, child, and family health. Rauh has been principal investigator on more than 20 major research projects, including studies of the impact of organophosphorus insecticides and secondhand smoke on child neurodevelopment and brain abnormalities (MRI), a randomized intervention trial for low birth weight infants, a multi-site study of lifestyles in pregnancy, a study of developmental outcomes of children born to inner-city adolescent mothers, a multi-level analysis of the impact of Head Start on NYC school children, a study of the effects of ambient air pollutants on pregnant women and their children, and a study of links between race, stressors, and preterm birth. Rauh has served on numerous national committees including the Scientific Advisory Board for the Environmental Protection Agency, NIH study sections, and expert panels for EPA, NIEHS, NIMH, and NICHD. Rauh is currently the Director of CHILD (Child Health Initiative for Learning and Development), a Columbia University initiative, and the co-director of Trauma-Free NYC, a NYC-wide partnership for trauma informed action.

John Schaeffler
Executive Global Government Relations Leader, General Electric/GE Healthcare

Prior to joining GE Healthcare in 2004, Schaeffler served as Senior Vice President for Policy and Government Affairs for the American Health Care Association, and as Senior Vice President for DaVita. Schaeffler started his career as a Congressional aide for two Congressmen from Minnesota. He currently serves on the Board of the Cross-Border Foundation, which works to harmonize regulatory processes and promote best policy practices between the U.S. and Canada. He lives in Arlington, Virginia, with his wife, Hillary, and two children.

Nik Steinberg
Forum Director, Columbia World Projects

Nik Steinberg is the Forum Director at Columbia World Projects. He previously served as the Counselor and Chief Speechwriter for Ambassador Samantha Power, U.S. Ambassador to the United Nations. Prior to that, Steinberg was Senior Researcher in the Americas Division of Human Rights Watch, where his work focused primarily on Mexico and Cuba. He is a graduate of Dartmouth College and the Harvard Kennedy School of Government.

Nicholas Tatonetti
Herbert Irving Assistant Professor of Biomedical Informatics,
Columbia University

Tatonetti trained in mathematics and molecular biology at Arizona State University before receiving his PhD in biomedical informatics in 2012 from Stanford University. His lab at Columbia is focused on expanding upon his previous work in detecting, explaining, and validating drug effects and drug interactions from large-scale observational data. Widely published in both clinical and bioinformatics journals, Tatonetti is passionate about the integration of hospital data (stored in electronic health records) and high-dimensional biological data (captured using next-generation sequencing, high-throughput screening, and other "omics" technologies). His lab develops algorithms, techniques, and methods for analyzing enormous and diverse data by designing rigorous computational and mathematical approaches that address the fundamental challenges of observational analysis: bias and confounding. Foremost, they integrate medical observations with systems and chemical biology models to not only explain clinical effects, but also to further our understanding of basic biology and human disease. Tatonetti has been featured by the *New York Times*, GenomeWeb, and Science Careers. His work has been picked up by the mainstream and scientific media and generated hundreds of news articles.

Kristen Underhill
Associate Professor of Law, Columbia University

Underhill's scholarship focuses on health law, with a particular interest in how the law influences individual decisions about risk and health behavior. She teaches health law and torts. Underhill studies how laws and regulations affect individual choices by arranging incentives, shaping opportunities, influencing underlying preferences, and communicating information about social norms. Recent projects have focused on how financial incentives influence attitudes about organ donation; the influence of implicit racial bias in altruistic decisions; dispute resolution for injuries and complaints related to biomedical research; and relationships between harm reduction and risk behavior. She is also currently completing a five-year study of access to new HIV prevention technologies, funded by the National Institutes of Health (NIH). Underhill received her J.D. from Yale Law School in 2011, serving as editor-in-chief of the *Yale Journal of Health Policy, Law, and Ethics*. Underhill also holds a D.Phil. in evidence-based social intervention from the University of Oxford, and she completed an NIH-funded postdoctoral research fellowship at Brown University's Center for Alcohol and Addiction Studies.

Martha Welch
Director of the Nurture Science Program in Pediatrics, Columbia University Irving Medical Center; Associate Professor of Psychiatry in Pediatrics and Pathology & Cell Biology

Welch has been a pioneer in the treatment of mother-child relational health for over 40 years. Her decades of clinical observation have led to a new paradigm employing mother-child co-regulatory vs. self-regulatory processes in establishing optimal maternal and child health and well-being. Welch leads a multidisciplinary team of researchers in testing her Family Nurture Intervention and exploring the underlying biological phenomenon she termed autonomic and emotional co-regulation. Emotional co-regulation is the key component of her Calming Cycle Theory, which posits that maternal and child symptomatic physiology and behavior can be eliminated through re-establishing and maintaining bottom-up visceral/autonomic co-regulatory processes within the family, initially between the mother and child. Welch received her medical degree from Columbia University College of Physicians & Surgeons. She is a Diplomate of the American Board of Psychiatry and Neurology and a Distinguished Fellow of the American Psychiatric Association.