Evidence for Impact 2020

Research Compendium

MSD for Mothers

Contents

A Message from MSD for Mothers

At MSD for Mothers, we know that generating evidence to demonstrate success is critical to achieving greater impact for mothers, their families and their communities. We believe that accelerating progress in reducing maternal mortality — essential to achieving the Sustainable Development Goals — requires 1) innovation in developing and delivering lifesaving interventions, 2) analysis of what truly works — and what doesn't — and 3) dissemination of results so that, as a community, we can act urgently on promising solutions to help save women's lives.

We are pleased to share *Evidence for Impact* 2020, our second MSD for Mothers research compendium. *Evidence for Impact* is a product of dozens of collaborations with leading academic centers, research institutions, think tanks and non-governmental organizations (NGOs) and features 117 peer-reviewed articles, independent evaluations, white papers, technical reports and conference abstracts that have been published since mid-2018. This edition is dedicated to quality of care: what it means; how we improve it; and how we sustain it.

In low- and lower-middle income countries, almost 60% of preventable deaths are the result of poor quality care.[1] According to Countdown to 2030, the quality of maternal health care services is poor in many of the 81 countries that account for 95% of all maternal deaths and 90% of all child deaths worldwide.[2] Improving access to care alone will not be enough to save lives — we must also invest in systems that can deliver high quality health care.

MSD for Mothers is MSD's USD $500 million global initiative to help create a world where no woman has to die while giving life. Over the past nine years, we have reached more than 11 million women around the world through programs promoting safe, high quality, respectful care. With our collaborators, we have helped increase access to high quality maternal health care and family planning services, strengthened health systems, advanced the United Nations' Sustainable Development Goals and supported the universal health coverage agenda.

High quality maternal health care sets the foundation for women, children, families, communities and societies to thrive for generations to come.[3,4] However, we have yet to fully understand the interplay among the many drivers of high quality care that improve health outcomes and how to scale and sustain quality maternity care. This compendium highlights recent publications stemming from collaborations that we have supported, with a focus on learnings and insights related to these fundamental questions.

Our approach to generating evidence is grounded in the need for real-time and action-oriented findings that will lead to positive change for women. We congratulate and thank the many collaborators and researchers whose important work is represented in *Evidence for Impact.* All of you have made notable contributions to advance the maternal health field — enabling the global health community to move more quickly from evidence to impact.

Dr. Mary-Ann Etiebet
Lead and Executive Director,
MSD for Mothers

A Message from Dr. Muhammad Ali Pate

The world's attention is focused more than ever on access to essential health services as countries struggle to respond to the COVID-19 pandemic. The hope is that the current crisis does not reverse the progress made in access to quality health care, which has led to significant declines in mortality — including maternal mortality — over the past two decades.

Keeping quality front and center in our efforts to build resilient health systems that can manage health emergencies while delivering primary care will allow us to save even more lives — and to do so equitably.

As a strong advocate for a quality movement, I am pleased that MSD for Mothers continues to be a champion for improving the quality of maternity care and helping ensure that women not only survive complications of pregnancy and childbirth, but also live healthy, productive lives.

Two years ago, The Lancet Global Health Commission on High-Quality Health Systems, which I was proud to co-chair, brought together a diverse group of actors to preview the findings. Following that discussion on how to turn this research into action, MSD for Mothers, along with close to 20 organizations from around the world, endorsed the *Bellagio Declaration on high-quality health systems: from a quality moment to a quality movement*.[5]

I have also had the opportunity to serve on the advisory board for MSD for Mothers. From its early days, the initiative has supported efforts to strengthen quality care in countries around the world; it is noteworthy that the initiative has also supported a research agenda. Enriching our understanding of how to achieve quality care for women is valuable for the global health community — and for society at large.

MSD for Mothers' second research compendium puts a spotlight on quality care from a variety of research perspectives. The breadth of articles is impressive, with a diversity of topics, contexts and research methodologies. As any good research does, many of these studies beg further exploration. *Evidence for Impact* provides critical insights about quality that have relevance well beyond maternal health. I am excited to see how they will be applied.

Dr. Muhammad Ali Pate
Global Director, Health, Nutrition and Population Global Practice, World Bank Group

Introduction

At our current rate of progress, we will fail to achieve the Sustainable Development Goal (SDG) target for reducing maternal mortality.[6] With only a decade remaining to accelerate efforts, the global health community needs to be laser-focused on helping save women's lives.

The urgency is mounting in the face of the COVID-19 pandemic. As we have seen with the Ebola outbreak five years ago and other health emergencies, women and girls suffer disproportionately when health systems are strained.[7] Concerns are growing that maternal mortality and morbidity will start heading in the wrong direction until the virus is under control.[8]

Against the backdrop of the pandemic and its health and economic toll, strategic decisions about the allocation of limited resources are crucial. Research on what works — and what doesn't — is an essential tool to chart the path forward.

At MSD, the journey to invention and discovery is guided by science — and inspired by patients. Similarly, MSD for Mothers' strategy is to support the evidence and data needed to understand and solve the tough challenges that are impeding progress in making pregnancy and childbirth safer for women around the world. We are driven to explore questions that remain unanswered about quality of care and improved health outcomes, health system design, social determinants of health and women's preferences for the care they want to receive.

This second research compendium reflects our collaborators' efforts to delve into longstanding questions centered around the theme of quality. We know that if the need for quality care and modern contraception is met, maternal deaths could be reduced by 62% in low- and middle-income countries (LMICs).[9] We know that women seek care from both the public and private sectors — approximately 40% of family planning services, antenatal care and institutional delivery services are delivered by the private sector[10] — and that quality of care is inconsistent and often poor in both.[11] We know that even with an increasing proportion of women giving birth in health facilities, rates of mortality and morbidity remain high in some settings — a sign of substandard care.[12] And we know that a key measure of quality — respectful care — continues to be a global problem.[13]

The publications in *Evidence for Impact* probe important structural questions about quality as it relates to women, health providers and health systems, such as:

- How do we engage women to report on the care they experience as well as demand high quality care?
- What kind of incentives are needed to encourage health providers to deliver quality care and sustain that level of care?
- How do health systems need to transform to address the social determinants of health that drive inequities in maternal health outcomes?

We have organized the compendium into three sections, highlighting our learnings in each:

1. Understanding women's experiences to improve the quality of maternity care;
2. Equipping providers to deliver quality maternity care; and
3. Strengthening health systems to improve the quality of maternity care.

Throughout, we have included examples of how this body of research is leading to impact — from new clinical guidelines and quality improvement initiatives to new models of integrated care and more robust pregnancy surveillance to better understand quality.

We are proud to support this vital research and contribute knowledge to the global health field. We hope the evidence our collaborators are generating will continue to accelerate much-needed action to help save women's lives.

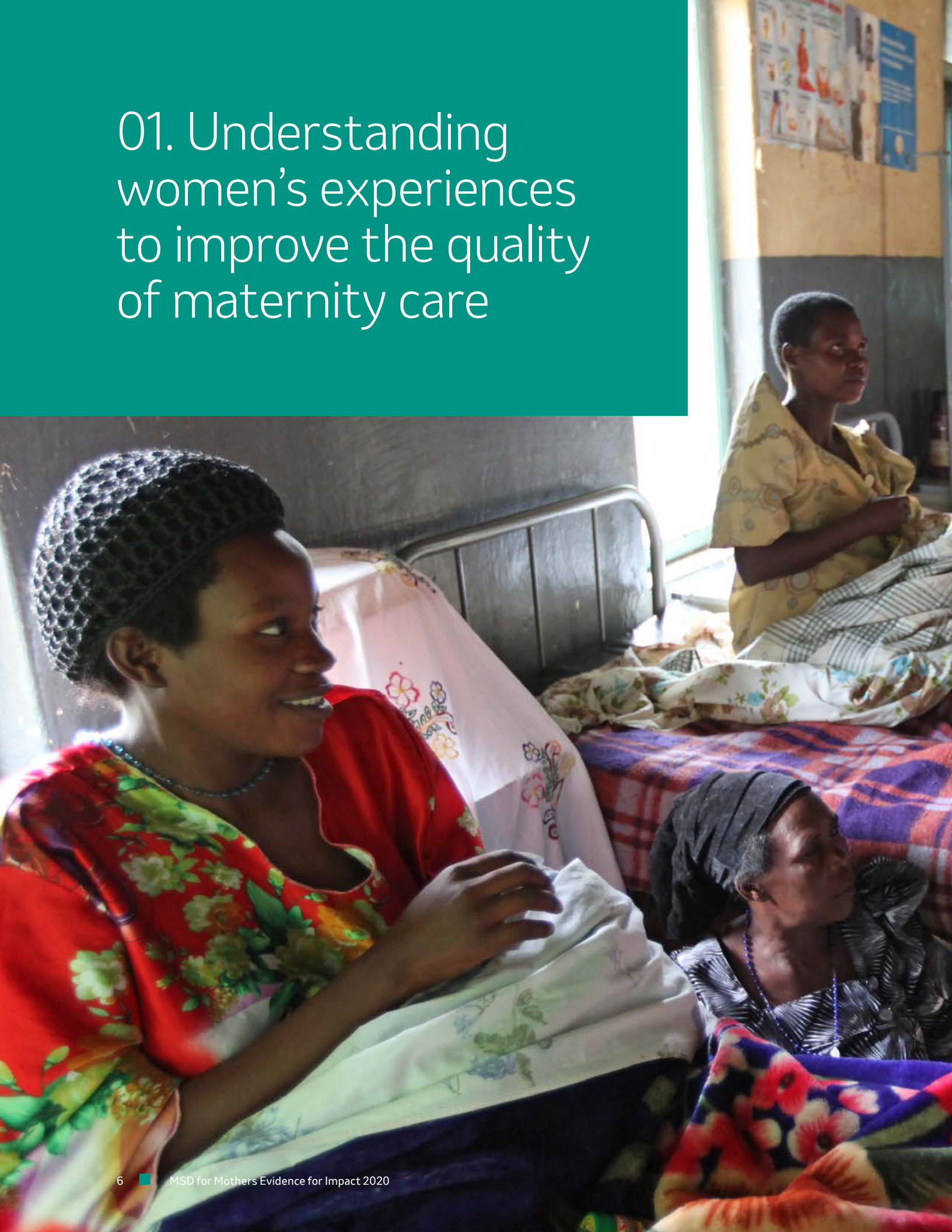
Evidence for Impact 2020 features learnings from MSD for Mothers-supported grantees and collaborators during May 2018 – October 2020.

117
Publications

47
Contributing grantees and collaborators

20+
Programs represented

01. Understanding women's experiences to improve the quality of maternity care



At MSD for Mothers, we believe that women should be full partners in the care they receive and that solutions for improving the quality of maternity care must be rooted in women's voices and experiences.

Our vision is that all women have the knowledge to make informed, independent decisions about where and how to access care; the tools and support to express their views about the care they receive; and an established and valued role in efforts to improve the quality of maternity care.

We have far to go to achieve this vision and much to learn along the way. The publications in this section examine women's experiences, perspectives and choices about their care across the pregnancy and childbirth continuum. Themes from the research highlight the importance of hearing directly from women about their maternal health needs — whether for reliable health information, programs and services that consider their preferences or treatment they deem respectful.

Research Focus: Understanding harm and disrespectful care during childbirth

Context

Mistreatment of women during childbirth is a global problem. Several studies have documented troubling reports of health care providers violating women's human rights and have confirmed that women frequently experience disrespectful and abusive care — including denial of pain medication, physical and verbal abuse, discrimination, violating patient confidentiality and performing medical interventions without patient consent.[14] These harms may lead to poor health outcomes[15] and create barriers to seeking care at health facilities during pregnancy, childbirth and for the longer term.[16] While mistreatment is recognized as a serious challenge to women's health and rights, there are many unanswered questions about the extent of the problem and the factors driving this unacceptable behavior.

Research Contributions

In India, MSD for Mothers' collaborators from the London School of Hygiene & Tropical Medicine investigated the nature and context of mistreatment of 275 women at public and private maternity facilities in Uttar Pradesh, India to better understand the extent of the problem.[17] Most of the women who participated experienced some form of mistreatment during childbirth, which ranged from clinical harms — over-medicalization of childbirth, use of non-evidence-based practices, inadequate hygiene and sanitation practices — to behavioral harms including verbal abuse and solicitation of informal fees.[18,19]

The U.S. has stark and persistent racial disparities in maternal health outcomes. We commissioned research to better understand the pregnancy and childbirth experiences of low-income women of color in New York City. The Columbia University Averting Maternal Death and Disability (AMDD) research team conducted 16 focus group discussions with 55 women of color who had given birth in the last two years, 23 doulas and 6 male partners. Nearly 100 in-depth interviews were conducted with hospital providers and staff from hospitals in these same neighborhoods.

Key Findings[20,21]

- The New York City research found that the types of disrespectful and abusive treatment women experienced during pregnancy and childbirth were similar to what has been documented globally.
- Racism and discrimination were particularly salient experiences for women of color — and influenced their perception of both how respectfully they were treated and the overall quality of care they received.
- Women of color and maternity care providers described the challenges of both navigating and working in a fragmented health care system where it was extremely difficult to build trusting relationships that could support women and families to experience childbirth in ways that affirmed their personal power and dignity.

UNDERSTANDING DISRESPECT AND ABUSE IN NEW YORK CITY

- Racism and discrimination influence perceptions of respect and overall quality of care
- Fragmented health care systems make it difficult to build patient-provider trust
- Patient-centered approaches need to be more sensitive to patient needs to ensure dignity and respect

- There was broad consensus among all the participants that maternity care providers and health systems needed to adopt a more patient-centered approach to care which would enable providers to be more sensitive to the needs of their patients and would safeguard that women would be treated with dignity and respect.

Researchers' Insights

- This study highlights the need for both specific actions to address common forms of disrespect and abuse as well as a broader transformation of the maternity care system.
- Disrespect and abuse in the U.S. context are products of a deeply fragmented health care system that consistently devalues women of color — and not solely a result of individual provider behavior — and contributes to mutual distrust between communities of color and the health care system. Pregnant people's and communities' trust must be earned and not assumed.
- Strategies for improving maternal health and reducing racial disparities in the U.S. must address non-clinical, systemic factors — as well as individual behaviors.
- This research suggests that simple training or awareness-raising workshops — whether for birthing families or for maternity staff — will not be enough to achieve the kind of transformation needed and widely desired.

QUESTION FOR FUTURE RESEARCH

To what extent can a culture of respectful care lead to improved maternal health outcomes and greater equity?

EVIDENCE FOR IMPACT

Integrating Questions About Birth Equity Into Pregnancy Surveillance

Following this research, the New York City Department of Health & Mental Hygiene collaborated with AMDD and administered a questionnaire on disrespect and abuse as part of the Centers for Disease Control and Prevention (CDC)'s Pregnancy Risk Assessment Monitoring System (PRAMS). The aim was to estimate the prevalence of disrespect and abuse and examine differences in women's responses among various social, racial and ethnic groups.

Based on a pilot study, the two organizations are now refining the tool to develop specific questions that will be integrated into the annual survey to help get an accurate picture of mistreatment and measure progress. The CDC as well as several states that participate in PRAMS have expressed interest in this effort and are adding selected questions to their own state surveys — a major step in understanding women's experiences given that PRAMS surveillance currently covers more than 80% of all U.S. births.

Research Focus: Leveraging digital platforms to learn what women are seeking from their care

Context

A patient-centered health care system requires improved interaction between those who are seeking care and those who are providing that care. More traditional tools to engage patients have relied on one-way communication to offer health information. However, new platforms have emerged that elicit feedback regarding patients' health care experiences, which health providers and health systems can use to improve the quality of care they deliver — and in a more timely manner. When coupled with advances in artificial intelligence (AI), these technologies hold great promise for improving health outcomes in low- and middle-income countries.[22]

Given that the COVID-19 pandemic has also drastically accelerated patient utilization of digital health technologies[23] and women and girls are turning increasingly to digital technologies to access information about their health,[24] understanding patients' experiences with digital platforms is a critical step towards building stronger AI algorithms that better predict and respond to their needs.

Research Contributions

MSD for Mothers' collaborator Nivi has developed a mobile platform which uses an AI-enabled chatbot, askNivi, to educate women on a range of reproductive health topics including available contraceptive methods to meet a woman's needs, and then connect her with a quality provider who has her chosen method in stock. Since 2017, Nivi has been "learning" continuously based on information from over 2.2 million users — more than 420,000 in Kenya and 1.8 million in India — so that people receive more personalized responses along their health journeys.

NIVI IN KENYA
RESEARCH FINDINGS

23 yr
Average age of Nivi users

37%
Proportion of male users

In an attempt to better understand how users engage with this digital platform, the research team mined nearly 180,000 anonymous text messages between users in Kenya and live agents. The team characterized the ways Kenyans communicated with askNivi in its early stages of development, examining the topic and intention of user messages from September 2017 to January 2019. They also characterized all conversations between a random subset of 100 users who engaged in extended chats.

QUESTION FOR
FUTURE RESEARCH

Given high engagement with this app among men and adolescents — traditionally hard to reach populations — how can technology be optimized to provide needed family planning information and services?

Key Findings[25]

- The average age of Nivi users was 23 years old and more than one-third (37%) of Nivi users were men.
- Most users sought general factual information, but requests for personalized advice based on individual experiences and symptoms were also common.
- Younger women (ages 15–19) were much more likely to ask how to identify safe and unsafe days for preventing pregnancy while older women (ages 25–35) chatted more frequently about family planning and cancers of the breast and cervix.
- Patterns of use varied by sex and age. For example, men were 1.7 times more likely than women to send only one message to askNivi.

Researchers' Insights

- AI approaches, such as text mining, are one way to improve understanding of how people engage with innovations like askNivi and determine how to maximize digital consumer engagement platforms.
- Digital innovations can be effective in reaching young people because they eliminate social barriers in accessing reliable health information — such as discomfort speaking with an older medical provider, stigma and discrimination.
- Although the platform was designed for and marketed to women, a large proportion of users were men, suggesting that all people are seeking reliable, real-time health information.

EVIDENCE FOR IMPACT

Several NGOs and foundations, including PSI India Private Limited, Jhpiego India, Packard Foundation, and MTV Staying Alive Foundation, are leveraging data and insights from Nivi to inform their family planning strategies, better reach target audiences, and identify evolving marketplace dynamics.

FEATURED PUBLICATION

Listening to the community: Using formative research to strengthen maternity waiting homes in Zambia.

PLOS One, March 2018. Scott, N. Aw., et al.[26]

In some parts of the world — particularly in remote, rural communities — women often need to travel long distances to reach a health facility that is equipped to provide safe childbirth services. Transportation might be hard to find — especially late at night — and, in the event of an emergency, there is no guarantee that a woman will reach a facility in time. Maternity waiting homes are shelters near health facilities where women can stay when they are close to giving birth and immediately thereafter so that they are able to receive timely facility-based obstetric care.

ABSTRACT

Background

The WHO recommends maternity waiting homes (MWH) as one intervention to improve maternal and newborn health. However, persistent structural, cultural and financial barriers in their design and implementation have resulted in mixed success in both their uptake and utilization. Guidance is needed on how to design a MWH intervention that is acceptable and sustainable. Using formative research and guided by a sustainability framework for health programs, we systematically collected data from key stakeholders and potential users in order to design a MWH intervention in Zambia that could overcome multi-dimensional barriers to accessing facility delivery, be acceptable to the community and be financially and operationally sustainable.

Methods and findings

We used a concurrent triangulation study design and mixed methods approach. We used free listing to gather input from a total of 167 randomly sampled women who were pregnant or had a child under the age of two (n = 59), men with a child under the age of two (n = 53) and community elders (n = 55) living in the catchment areas of four rural health facilities in Zambia. We conducted 17 focus group discussions (n = 135) among a purposive sample of pregnant women (n = 33), mothers-in-law (n = 32), traditional birth attendants or community maternal health promoters (n = 38) and men with a child under two (n = 32). We administered 38 semi-structured interviews with key informants who were identified by free list respondents as having a stake in the condition and use of MWHs. Lastly, we projected fixed and variable recurrent costs for operating a MWH.

Respondents most frequently mentioned distance, roads, transport and the quality of MWHs and health facilities as the major problems facing pregnant women in their communities. They also cited inadequate advanced planning for delivery and the lack of access to delivery supplies and baby clothes as other problems. Respondents identified the main problems of MWHs specifically as over-crowding, poor infrastructure, lack of amenities, safety concerns and cultural issues. To support operational sustainability, community members were willing to participate on oversight committees and contribute labor. The annual fixed recurrent cost per 10-bed MWH was estimated as USD $543, though providing food and charcoal added another USD $3,000. Respondents identified water pumps, an agriculture shop, a shop for baby clothes and general goods and grinding mills as needs in their communities that could potentially be linked with an MWH for financial sustainability.

Conclusions

Findings informed the development of an intervention model for renovating existing MWHs, or constructing new MWHs, that meets community standards of safety, comfort and services offered and is aligned with government policies related to facility construction, ownership and access to health services. The basic strategies of the new MWH model include improving community acceptability, strengthening governance and accountability and building upon existing efforts to foster financial and operational sustainability. The proposed model addresses the problems cited by our respondents and challenges to MWHs identified by in previous studies and elicits opportunities for social enterprises that could serve the dual purpose of meeting a community need and generating revenue for the MWH.

Section 01. Understanding Women's Experiences to Improve the Quality of Maternity Care

Peer-reviewed journal articles in this section highlight research aimed at improving women's maternity care experience and engagement with the health care system. These articles explore barriers and facilitators to care including demographic characteristics and understanding women's needs, views and preferences about their pregnancy and childbirth.

PEER-REVIEWED JOURNAL ARTICLES

01 Bonawitz, R., McGlasson, K. L., Kaiser, J. L., Ngoma, T., Lori, J., Boyd, C., … Scott, N. A. (2019). Maternity waiting home use by HIV-positive pregnant women in Zambia: Opportunity for improved prevention of maternal to child transmission of HIV. *International Journal of MCH and AIDS, 8*(1), 1–10.

02 Buser, J. M., Moyer, C. A., Boyd, C. J., Zulu, D., Ngoma-Hazemba, A., Mtenje, J. T., … & Lori, J. R. (2020). Cultural beliefs and health-seeking practices: Rural Zambians' views on maternal-newborn care. *Midwifery,* 102686.

03 Buser, J. M., Moyer, C. A., Boyd, C. J., Zulu, D., Ngoma-Hazemba, A., Mtenje, J. T., … & Lori, J. R. (2020). Maternal knowledge of essential newborn care in rural Zambia. *Health Care for Women International,* 1-16.

04 Cavallaro, F. L., Duclos, D., Cresswell, J. A., Faye, S., Macleod, D., Faye, A., & Lynch, C. A. (2018). Understanding 'missed appointments' for pills and injectables: A mixed methods study in Senegal. *BMJ Global Health, 3*(6).

05 Chibuye, P. S., Bazant, E. S., Wallon, M., Rao, N., & Fruhauf, T. (2018). Experiences with and expectations of maternity waiting homes in Luapula Province, Zambia: A mixed-methods, cross-sectional study with women, community groups and stakeholders. *BMC Pregnancy and Childbirth, 18*(1), 42.

06 Chiu, C., Scott, N. A., Kaiser, J. L., Ngoma, T., Lori, J. R., Boyd, C. J., & Rockers, P. C. (2019). Household saving during pregnancy and facility delivery in Zambia: A cross-sectional study. *Health Policy and Planning, 34*(2), 102-109.

07 Green, E. P., Augustine, A., Naanyu, V., Hess, A. K., & Kiwinda, L. (2018). Developing a digital marketplace for family planning: Pilot randomized encouragement trial. *Journal of Medical Internet Research, 20*(7), e10756.

08 Green, E. P., Whitcomb, A., Kahumbura, C., Rosen, J. G., Goyal, S., Achieng, D., & Bellows, B. (2019). "What is the best method of family planning for me?": A text mining analysis of messages between users and agents of a digital health service in Kenya. *Gates Open Research, 3.* [Gates open research]

09 Kaiser, J. L., Fong, R. M., Hamer, D. H., Biemba, G., Ngoma, T., Tusing, B., & Scott, N. A. (2019). How a woman's interpersonal relationships can delay care-seeking and access during the maternity period in rural Zambia: An intersection of the social ecological model with the three delays framework. *Social Science & Medicine, 220,* 312-321.

10 Lori, J. R., Boyd, C. J., Munro-Kramer, M. L., Veliz, P. T., Henry, E. G., Kaiser, J., … & Scott, N. (2018). Characteristics of maternity waiting homes and the women who use them: Findings from a baseline cross-sectional household survey among SMGL-supported districts in Zambia. *PLOS One, 13*(12), e0209815.

11 Munro-Kramer, M. L., Scott, N., Boyd, C. J., Veliz, P. T., Murray, S. M., Musonda, G., & Lori, J. R. (2018). Postpartum physical intimate partner violence among women in rural Zambia. *International Journal of Obstetrics and Gynaecology, 143*(2), 199-204.

12 Scott, N. A., Henry, E. G., Kaiser, J. L., Mataka, K., Rockers, P. C., Fong, R. M., … & Lori, J. R. (2018). Factors affecting home delivery among women living in remote areas of rural Zambia: A cross-sectional, mixed-methods analysis. *International Journal of Women's Health, 10,* 589.

13 Scott, N. A., Vian, T., Kaiser, J. L., Ngoma, T., Mataka, K., Henry, E. G., … & Hamer, D. H. (2018). Listening to the community: Using formative research to strengthen maternity waiting homes in Zambia. *PLOS One, 13*(3), e0194535.

14 Sharma, G., Penn-Kekana, L., Halder, K., & Filippi, V. (2019). An investigation into mistreatment of women during labour and childbirth in maternity care facilities in Uttar Pradesh, India: A mixed methods study. *Reproductive Health, 16*(1), 7.

15 Wong, K. L., Radovich, E., Owolabi, O. O., Campbell, O. M., Brady, O. J., Lynch, C. A., & Benova, L. (2018). Why not? Understanding the spatial clustering of private facility-based delivery and financial reasons for homebirths in Nigeria. *BMC Health Services Research, 18*(1), 397.

PEER-REVIEWED CONFERENCE ABSTRACTS

01 Femi-Pius, O. & Arogundade, K. An integrated right-based approach in promoting respectful maternity care in health facilities in Cross River State: The SMGL experience. *Presented at 2018 Canadian Conference on Global Health (CCGH) organized by Canadian Society for International Health.*

02 Freedman, L. A 360-degree approach to understanding disrespect and abuse of women during childbirth: Creating space for women and providers to define the challenges. *Presented at American Public Health Association 2019 Annual Meeting and Expo.*

WHITE PAPERS, TECHNICAL BRIEFS, AND REPORTS

01 Freedman, L., McNab, S., Won, S.H., Abelson, A., & Manning, A. (2020). Disrespect and abuse of women of color during pregnancy and childbirth: Findings from qualitative exploratory research in New York City. *Columbia Mailman School of Public Health Averting Maternal Death and Disability.* [Working Paper]

02 *Girl Effect and Women Deliver.* (2020). Going online for sexual and reproductive health: Meaningfully engaging adolescent girls and young women for smarter digital interventions.

03 *PharmAccess Foundation.* (2020). What keeps pregnant women from attending care? Determinants of antenatal care visits and skills delivery in Kenya.

02. Equipping providers to deliver quality maternity care

Health providers — nurses, doctors, community health workers (CHWs), midwives, doulas and others — are on the frontlines delivering maternity care and have a direct impact on the quality of care women receive during pregnancy and childbirth.

The contexts in which health providers work and the resources they have at their disposal vary extensively across the globe. However, we believe all providers, whether they practice in urban or rural areas, in public or private facilities, in primary care or tertiary care centers, should be equipped with the information, training, supplies, medicines, support and referral options needed to successfully manage a childbirth complication and help save a woman's life.

The publications in this section focus on how to best equip health providers with lifesaving innovations, information and tools they can use to consistently deliver quality care. Themes include the importance of scientific evidence, availability of resources and champions within a health facility to support a culture among providers that will sustain quality maternity care.

Research Focus: Implementing evidence-based practices to standardize high quality emergency obstetric care

Context

Based on a MSD for Mothers-supported multi-state analysis of Maternal Mortality Review Committee findings in the U.S., the Centers for Disease Control and Prevention found that more than 60% of pregnancy-related deaths in the United States are preventable.[27] Medical errors, ineffective and delayed treatments and lack of care coordination by clinicians and hospitals cause many of these deaths.[28]

A significant contributor to maternal mortality and morbidity in the U.S. has been inconsistency among care teams — even within the same hospital — in identifying and responding immediately and appropriately to an obstetric emergency. In the past few years, "safety bundles" — standard sets of evidence-based practices and tools[29] — have been developed and are now being implemented across the country to overcome this longstanding challenge.

Research Contributions

MSD for Mothers supported implementation science studies of three initiatives to introduce safety bundles in more than 300 hospitals across four states (California, Georgia, New Jersey and New York) and Washington, DC. The safety bundles address three of the leading causes of maternal death: hemorrhage (excessive bleeding during or immediately after childbirth), preeclampsia/eclampsia (a hypertensive disorder of pregnancy) and venous thromboembolism (blood clots).

Researchers from The Ohio State University examined the implementation models in these states to help determine how to scale these tools effectively nationwide. They conducted one-on-one and group interviews with 28 project administrators. The lead implementers in New York (American College of Obstetricians and Gynecologists — District II) and in Georgia, New Jersey and Washington, DC (Association of Women's Health and Neonatal Nurses) also conducted assessments of their projects. The California Maternal Quality Care Collaborative evaluated the impact of their efforts on racial disparities in severe maternal morbidity cases from hemorrhage.

Key Findings

- Of the 123 maternity hospitals in New York State, nearly all (117) participated in the Safe Motherhood Initiative and implemented the obstetric hemorrhage bundle.[30]
- Hospitals in Georgia, New Jersey and Washington, DC demonstrated improvement in responding to postpartum hemorrhage in several areas: quantification of blood loss increased from 5% to 45%, hemorrhage risk assessment increased from 10% to 70%, pre-birth risk assessment increased from 2% to 52% and post-birth risk assessment increased from 2% to 57%.[31]

RATE OF SEVERE MATERNAL MORBIDITY AMONG WOMEN WITH HEMORRHAGE IN CALIFORNIA

Pre-intervention	28.6%
Post-intervention	18.5%

- In California, the rate of severe maternal morbidity among women with hemorrhage fell to 18.5% from 28.6% after the intervention. Black women, who experience higher rates of severe maternal morbidity compared to white women, saw a greater reduction in severe maternal morbidity compared to white women (9% vs. 2.1% absolute rate reduction).[32]
- There was insufficient evidence to demonstrate a change in hemorrhage-related mortality and morbidity over the period studied in Georgia, New York, New Jersey or Washington, DC.[33,34]

Researchers' Insights

- Improving access to effective quality improvement interventions has the potential to decrease racial disparities within severe maternal morbidity.
- Implementing safety bundles requires a long-term, multidisciplinary approach. Everyone, from obstetrician-gynecologists, to obstetric nurses and midwives, to blood bank operators to anesthesiologists, should be engaged in the process.
- Quality improvement efforts should be coupled with a robust data infrastructure, including maternal mortality reviews, but this may be a challenge for many hospitals.
- Statewide implementation of safety bundles is feasible, but highly dependent on having critical resources in place at the facility. The most important enabler of successful implementation is engaged champions within the hospital — nurses, physicians and administrators — who recognize that these tools have the potential to help save women's lives and prevent the serious long-term health consequences of poor care.

QUESTION FOR FUTURE RESEARCH

To what extent can standardizing obstetric care narrow racial disparities in maternal health outcomes?

EVIDENCE FOR IMPACT

National multi-year initiative integrates safety bundles in state and hospital-level quality improvement efforts.

To further expand the reach of these critical tools, the United States Department of Health and Human Services' Health Resources and Services Administration established the Alliance for Innovation on Maternal Health (AIM), a multi-year, national data-driven maternal safety and quality improvement initiative, to implement safety bundles in all health facilities across the country.

Research Focus: Contributing new insights to help prevent postpartum hemorrhage

Context

Excessive bleeding after birth, also known as postpartum hemorrhage (PPH), is the leading direct cause of maternal death worldwide, accounting for about 20% of all maternal deaths.[35] Yet many of these deaths — as well as PPH-associated complications, long-term morbidity and health care costs — could be prevented if health providers had access to quality life-saving medicines and other tools.[36,37]

There are several drugs used to prevent PPH. The current standard of care is oxytocin, which is temperature sensitive.[38] Multiple studies in low- and lower-middle-income countries have found quality issues and potential loss of efficacy of oxytocin, which could be due to lack of refrigeration and inadequate storage at distribution facilities.[39]

Research Contributions

MSD for Mothers has made significant investments in research and development to prevent PPH,[40] including a large-scale evaluation of the effectiveness of heat-stable carbetocin compared to oxytocin.[41] The CHAMPION (**C**arbetocin **Hae**m**o**rhage **P**revent**ion**) clinical trial was led by the World Health Organization (WHO) and supported by Ferring Pharmaceuticals (the innovator and manufacturer of heat-stable carbetocin) and MSD for Mothers per a tripartite agreement. Involving nearly 30,000 women in 10 countries, it is the largest clinical trial ever conducted in PPH prevention. The trial results were published in the *New England Journal of Medicine* in 2018.

PROJECT CHAMPION: THE LARGEST CLINICAL TRIAL IN PPH PREVENTION

10 COUNTRIES REPRESENTED

~30,000 WOMEN ENROLLED

Key Findings

- Heat-stable carbetocin was non-inferior to oxytocin for the prevention of blood loss of at least 500 ml after a vaginal birth.
- The frequency of blood loss ≥500ml or additional uterotonic use was 14.5% in the carbetocin group and 14.4% in the oxytocin group. Results are consistent with non-inferiority.
- Non-inferiority was not demonstrated for the second primary outcome of blood loss of ≥ 1,000ml; however, the trial was underpowered for this outcome.[42]

Researchers' Insights

- Heat-stable carbetocin is equally effective as high-quality oxytocin in preventing postpartum hemorrhage.
- There were no significant differences between the two groups in other measures of bleeding or in adverse effects.
- A product that remains safe and effective without refrigeration could have a major impact on protecting women's lives in parts of the world where available and reliable cold chain transportation and storage are barriers to effective prevention of PPH.

QUESTION FOR FUTURE RESEARCH

How does a heat-stable medicine help conserve health system resources — what is its impact on health outcomes, health care use and costs and the broader health system?

EVIDENCE FOR IMPACT

Heat-stable carbetocin included in WHO's Model List of Essential Medicines and referenced in guidelines for prevention of postpartum hemorrhage.

The results of the CHAMPION clinical trial were published and references to heat-stable carbetocin have been added to the *WHO Model List of Essential Medicines*[43] *and in the WHO recommendations on Uterotonics for the prevention of postpartum hemorrhage.*[44] The guidelines recommend the use of carbetocin (100 µg, IM/IV) for the prevention of PPH for all births in contexts where its cost is comparable to other effective uterotonics. In settings where oxytocin is unavailable (or its quality cannot be guaranteed), the use of other injectable uterotonics (carbetocin, or if appropriate ergometrine/methylergometrine, or oxytocin and ergometrine fixed-dose combination) or oral misoprostol is recommended for the prevention of PPH.

Ferring Pharmaceuticals has announced that the heat-stable formulation of carbetocin will be made available at an affordable and sustainable price, comparable to the price of high quality UNFPA oxytocin, in publicly controlled or publicly funded health care facilities and health care facilities operating on a not-for-profit basis, including through social marketing, in low- and lower-middle income countries.[45] Ferring communicated this long-term commitment at the Nairobi Summit on ICPD25, as part of universal health coverage (UHC), to help deliver on the vision of zero preventable maternal deaths.

FEATURED PUBLICATION

Frequency and management of maternal infection in health facilities in 52 countries: WHO Global Maternal Sepsis Study (GLOSS).

The Lancet Global Health, May 2020. Bonet, M., et al.[46]

Globally, maternal sepsis — organ dysfunction resulting from infection in pregnant or recently pregnant women, as defined by the WHO[47] — is one of the leading causes of maternal mortality. Though the exact prevalence of sepsis is not known, it is estimated that about 10% of maternal deaths are due to direct obstetric infection,[48] with an estimated 11.9 million cases in 2017.[49] Quality improvement efforts to reduce mortality and morbidity from infection lag behind those for other contributors to maternal death, in part due to limited knowledge about its causes and treatment.

ABSTRACT

Background

Maternal infections are an important cause of maternal mortality and severe maternal morbidity. We report the main findings of the WHO Global Maternal Sepsis Study, which aimed to assess the frequency of maternal infections in health facilities, according to maternal characteristics and outcomes, and coverage of core practices for early identification and management.

Methods

We did a facility-based, prospective, 1-week inception cohort study in 713 health facilities providing obstetric, midwifery or abortion care, or where women could be admitted because of complications of pregnancy, childbirth, postpartum or post-abortion, in 52 low- and middle-income countries (LMICs) and high-income countries (HICs). We obtained data from hospital records for all pregnant or recently pregnant women hospitalized with suspected or confirmed infection. We calculated ratios of infection and infection-related severe maternal outcomes (i.e., death or near-miss) per 1,000 livebirths and the proportion of intrahospital fatalities across country income groups, as well as the distribution of demographic, obstetric, clinical characteristics and outcomes and coverage of a set of core practices for identification and management across infection severity groups.

Findings

Between Nov 28, 2017, and Dec 4, 2017, of 2,965 women assessed for eligibility, 2,850 pregnant or recently pregnant women with suspected or confirmed infection were included. 70·4 (95% CI 67·7–73·1) hospitalized women per 1,000 livebirths had a maternal infection, and 10·9 (9·8–12·0) women per 1,000 livebirths presented with infection-related (underlying or contributing cause) severe maternal outcomes. Highest ratios were observed in LMICs and the lowest in HICs. The proportion of intrahospital fatalities was 6·8% among women with severe maternal outcomes, with the highest proportion in low-income countries. Infection-related maternal deaths represented more than half of the intrahospital deaths. Around two-thirds (63·9%, n=1821) of the women had a complete set of vital signs recorded or received antimicrobials the day of suspicion or diagnosis of the infection (70·2%, n=1875), without marked differences across severity groups.

Interpretation

The frequency of maternal infections requiring management in health facilities is high. Our results suggest that contribution of direct (obstetric) and indirect (non-obstetric) infections to overall maternal deaths is greater than previously thought. Improvement of early identification is urgently needed, as well as prompt management of women with infections in health facilities by implementing effective evidence-based practices.

Section 02.
Equipping providers to deliver quality care

Peer-reviewed journal articles in this section highlight research aimed at improving the quality of services and delivery of care by physicians, nurses, skilled-birth attendants and other health care providers. Articles explore the quality of care offered by providers as well as findings from quality improvement programs and initiatives.

PEER-REVIEWED JOURNAL ARTICLES

01 Atallah, F., & Goffman, D. (2019). Bundles for maternal safety: Promises and challenges of bundle implementation: The case of obstetric hemorrhage. *Clinical Obstetrics and Gynecology, 62*(3), 539-549.

02 Benova, L., Owolabi, O., Radovich, E., Wong, K. L., Macleod, D., Langlois, E. V., & Campbell, O. M. (2019). Provision of postpartum care to women giving birth in health facilities in Sub-Saharan Africa: A cross-sectional study using Demographic and Health Survey data from 33 countries. *PLOS Medicine, 16*(10), e1002943.

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06 Bolan, N. E., Newman, S. D., & Nemeth, L. S. (2019). Technology-based newborn health learning initiatives for facility-based nurses and midwives in low-and middle-income countries: A scoping review. *International Journal of Childbirth, 8*(4), 252-268.

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12 Cavallaro, F. L., Benova, L., Wong, K., Sheppard, P., Faye, A., Radovich, E., ... & Martinez-Alvarez, M. (2020). What the percentage of births in facilities does not measure: Readiness for emergency obstetric care and referral in Senegal. *BMJ Global Health, 5*(3), e001915.

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14 Choudhry, V., Weiner, B., Karkhanis, P., Avinandan, V., Shah, N., Bahl, N., ... & Chandurkar, D. (2020). Determinants of technology use for a mobile health intervention across public health facilities in rural India: Protocol for implementation research. *Gates Open Research, 4*(51), 51. [Gates Open Research]

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41 Tripathi, S., Srivastava, A., Memon, P., Nair, T. S., Bhamare, P., Singh, D., & Srivastava, V. (2019). Quality of maternity care provided by private sector healthcare facilities in three states of India: A situational analysis. *BMC Health Services Research, 19*(1), 1-9.
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43 Widmer, M., Piaggio, G., Hofmeyr, G. J., Carroli, G., Coomarasamy, A., Gallos., … & Althabe, F. (2020). Maternal characteristics and causes associated with refractory postpartum haemorrhage after vaginal birth: A secondary analysis of the WHO CHAMPION trial data. *International Journal of Obstetrics and Gynaecology, 127*(5), 628–634.
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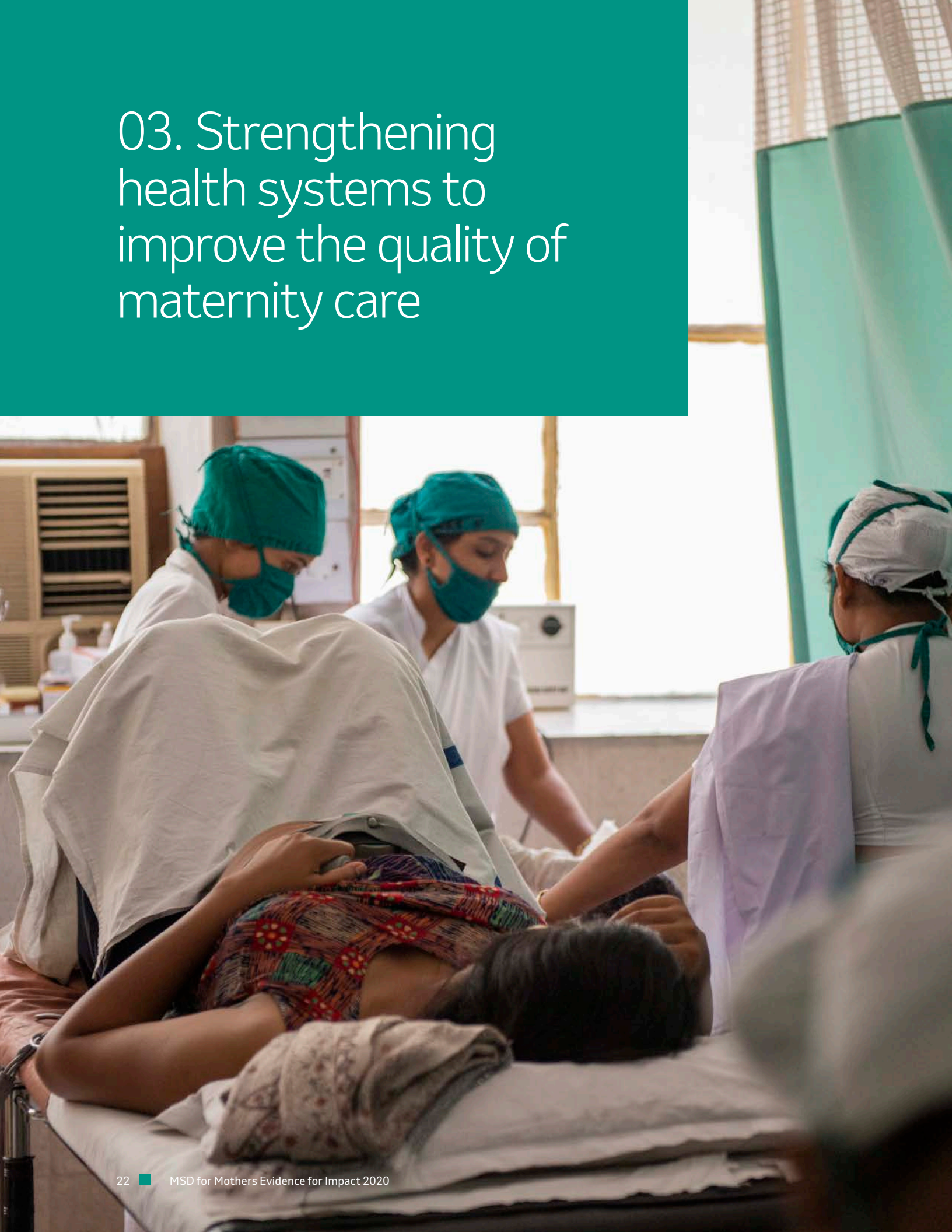
PEER-REVIEWED CONFERENCE ABSTRACTS

01 Walker, D. M., Huerta, T., & McAlearney, A. S. Designing quality improvement collaboratives to disseminate evidence-based practices. *Presented at Academy of Management Best Paper Proceedings 2018.*

WHITE PAPERS, TECHNICAL BRIEFS, AND REPORTS

01 Theunissen, F., Cleps, I., Chinery, L., Bochaton, F., & Vemer, H. (2018). Oxytocin Quality — Evidence for Action. *Concept Foundation.*

03. Strengthening health systems to improve the quality of maternity care



MSD for Mothers believes that a more comprehensive and integrated approach to delivering maternity care is required to provide women — especially women who are the most marginalized — with quality care.

An exclusive focus on medical factors and clinical interventions will likely miss other opportunities to improve health outcomes. It is time to look beyond the four walls of a maternity ward to the social, environmental and structural factors that also contribute to a woman's access to quality care, experience of care and health outcomes.

The publications in this section increase our understanding of the health care ecosystem and how to transform models of health care delivery to better address the social determinants of health — whether environmental, cultural, financial or social. A common theme from this research — across the U.S. and in sub-Saharan Africa — is that an exclusive focus on clinical issues is insufficient in overcoming systemic barriers to care that affect women's health and wellbeing.

Research Focus: Taking a comprehensive health systems approach to rapidly reduce maternal mortality

Context

A maternal death is a key indicator that a health system is not functioning as it should. Strengthening the health care ecosystem is a major undertaking that requires a comprehensive yet targeted approach to bring about systemic changes that will save women's lives.

In 2012, MSD for Mothers became a founding member of Saving Mothers, Giving Life (SMGL), an ambitious public-private partnership led by the U.S. government to quickly and dramatically reduce maternal mortality in sub-Saharan Africa. SMGL's range of district-wide interventions was extensive with an intentional focus on strengthening the whole health system — both public and private health facilities — and engaging families and communities as well as district and national governments to help save women's and newborns' lives. Components of the initiative addressed both clinical and community factors that contribute to high maternal mortality and morbidity. The five-year initiative began in target districts in Uganda and Zambia and later expanded to Cross River State, Nigeria.

Research Contributions

The Centers for Disease Control and Prevention conducted the baseline and final assessments of SMGL in Uganda and Zambia using data gathered from facilities as well as rigorous population-based data. In March 2019, *Global Health, Science and Practice* published a supplement featuring a series of peer-reviewed articles on the findings from the initiative, including health impact, cost effectiveness and sustainability.

Key Findings

Uganda and Zambia[50,51]

- The target districts in Uganda showed a 44% reduction in maternal mortality ratio and those in Zambia experienced a 41% decline over five years. The average annual rate of reduction exceeded that found countrywide: 11.5% versus 3.5% in Uganda and 10.5% versus 2.8% in Zambia.

SAVING MOTHERS, GIVING LIFE
FIVE YEAR RESEARCH FINDINGS

▼44%
REDUCTION
Maternal mortality ratio in Uganda target districts

▼41%
REDUCTION
Maternal mortality ratio in Zambia target districts

- Facility deliveries increased by 47% in Uganda and 44% in Zambia and the rate of maternal deaths in facilities dropped even as the proportion of women giving birth in facilities increased.

- In Uganda, the cost per death averted was USD $10,311, or USD $177 per life-year gained. In Zambia, the cost per death averted was USD $12,514, or USD $206 per life-year gained. These costs are less than 50% of GDP per capita, which is an indicator of cost-effectiveness.
- SMGL demonstrated increased efficiency in allocation of resources for maternal and newborn health, better use of strategic information, improved management capacities and increased community engagement. However, the partnership did not contribute to significant changes in Uganda or Zambia's domestic resource mobilization or increased government funding.

Nigeria[52]

- Preliminary evaluation data from Pathfinder, the implementing organization in Nigeria, demonstrated that after just two years, Cross River State achieved a:
  - 28% reduction in maternal mortality ratio (from baseline of 313/100,000 to 225/100,000)
  - 24% reduction in neonatal mortality rate (from baseline of 58/1,000 to 44/1,000)

Researchers' Insights

- A comprehensive district-wide approach to health system strengthening can achieve significant population level improvements in maternal and newborn health outcomes. In addition, enhancing the capacity of Ministries of Health to provide essential public health services has created a ripple effect that has improved health care delivery more broadly — providing health system benefits to population groups beyond mothers and newborns — and has helped sustain the gains in maternal and newborn health.
- Engaging communities to support safe pregnancy and childbirth practices is an effective way to encourage more women to give birth in a health facility.
- The SMGL approach represents a cost-effective health investment in terms of deaths averted and life-years gained in both Uganda and Zambia.
- The level of management burden for this initiative was high, and participants, especially bilateral donors, are traditionally not structured to be nimble, proactive or inventive. Yet several global endeavors could benefit from endorsing the SMGL approach.

QUESTION FOR FUTURE RESEARCH

With impressive results in reducing maternal mortality in three countries, how can we replicate Saving Mothers, Giving Life's success in a cost-effective way?

"Saving Mothers, Giving Life's health systems approach is a catalytic one because it builds ownership — and that is the type of approach that can be sustained. It ties communities to district health leadership and national policy makers, and even when support is over, you have a strengthened primary health care system."

— DR. KENNEDY MALAMA, PERMANENT SECRETARY, MINISTRY OF HEALTH, ZAMBIA

EVIDENCE FOR IMPACT

The State Ministry of Health in Nigeria adopts the SMGL model, helping to bring high quality, integrated care to all pregnant women.

The government in Cross River State is sustaining key components of this comprehensive model, including efforts to ensure that more than 90% of women in the state have sustained access to obstetric care within two hours. In addition, there are now dedicated budget lines to 1) implement an integrated supportive supervision checklist to help ensure quality care in public and private facilities and 2) continue maternal and perinatal death surveillance in both public and private facilities to make sure all deaths are counted, reported and reviewed.

Research Focus: Redesigning the maternal health team to address the social determinants of health

Context

The social determinants of health — access to social, educational and economic opportunities, family and community supports and resources, as well as societal and environmental factors including racism and discrimination — play an important role in whether women receive the care they need while pregnant.[53] In addition, the rise in chronic health conditions is contributing to poor maternal health outcomes. Increasingly, pregnant women have underlying health conditions such as diabetes, hypertension, obesity and other health challenges. When these underlying conditions and social determinants are not addressed adequately, women are at greater health risk during pregnancy, childbirth and postpartum.[54]

MSD for Mothers supported efforts to develop and test new community-based models of care that link prenatal and primary care more effectively. A foundational component was the multi-disciplinary care team. Doulas and CHWs specially trained in maternal health worked closely with women to provide extensive support to help navigate the social and environmental factors that may prevent women from receiving care in Camden, Philadelphia and New York City.

Research Contributions

Yale University School of Public Health conducted an evaluation of the three programs in partnership with the community-based organizations that led them. The researchers assessed health outcomes, utilization of appropriate care, and cost using a range of methods, including focus groups, qualitative interviews and quantitative analysis of health outcomes. Researchers also used photo voice, a method that asks participants to take photographs and develop captions or stories to describe the image. The goal was to capture and share the experiences of both the CHWs and the women they are supporting. These are critical voices and perspectives that are often missing from research.

"[My community health workers] helped me retain the necessities for my children and find peace with my new status of being medically prohibited to work. Finding balance is an ever revolving process. Now that my daughter is here, the smiles and stability of my children are what matter most to me."

— CLIENT, NORTHERN MANHATTAN PERINATAL PARTNERSHIP

Key Findings

- The women who participated, reported that CHWs contributed to their well-being during pregnancy in numerous ways and credited CHWs for improvements in mental health and health behaviors. Services like providing guidance around nutrition appeared to play a role in improving client management of chronic disease.[55]
- CHWs were able to foster women's self-sufficiency and engender trust in the health care and social service systems.[56]

WOMEN RECEIVING HEALTH WORKER SUPPORT IN PHILADELPHIA

▼68% lower odds of inadequate prenatal care

▼49% lower odds of inpatient admission

▼50% lower odds of emergency room/triage visits

- Participants in the Philadelphia program, relative to a comparison group (women who were eligible to participate but did not enroll), had 68% lower odds of inadequate prenatal care, 49% lower odds of inpatient admission, 50% lower odds of emergency room/triage visits during pregnancy and were more likely to attend their postpartum visit and use postpartum contraception.[57,58]

Researchers' Insights

- CHW programs may have a significant impact on increasing rates of attendance for both prenatal care and postpartum visits, which contribute to improved maternal health outcomes. They may also reduce hospital admissions and emergency room use, averting costs to the health care system.
- CHW intervention is particularly valuable for women facing challenges such as chronic conditions and limited access to resources.
- CHWs, including doulas, should be integrated into health systems, including insurance coverage for their services.
- The CHW model — which provides care in the home and the community and helps coordinate and provide linkages to needed social and other support — has potential to strengthen the maternity care team: it is tailored to the client's needs and circumstances and is based on patient-centered, two-way communication, creating a close, trust-based relationship.

QUESTION FOR FUTURE RESEARCH

How can the maternity care team be reimagined to better integrate care, achieve equity and improve outcomes?

FEATURED PUBLICATIONS

Stark racial, ethnic and geographic disparities have long plagued U.S. maternal health. Ensuring all women receive consistent, high quality care has been proposed as one strategy for eliminating these inequities,[59] but emerging research suggests that quality improvement alone is insufficient to move the needle.[60] National maternal health experts have begun to call for a more holistic, system-wide approach that integrates different sectors to better meet pregnant women's needs.

Vital signs: Pregnancy-related deaths, United States, 2011–2015, and strategies for prevention, 13 states, 2013–2017.

Morbidity and Mortality Weekly Report, 68(18), 423. Petersen, E. E., Davis, N. L., Goodman, D., Cox, S., Mayes, N., Johnston, E., ... & Barfield, W. (2019).[61]

ABSTRACT

Background
Approximately 700 women die from pregnancy-related complications in the United States every year.

Methods
Data from CDC's national Pregnancy Mortality Surveillance System (PMSS) for 2011–2015 was analyzed. Pregnancy-related mortality ratios (pregnancy-related deaths per 100,000 live births; PRMRs) were calculated overall and by sociodemographic characteristics. The distribution of pregnancy-related deaths by timing relative to the end of pregnancy and leading causes of death were calculated. Detailed data on pregnancy-related deaths during 2013–2017 from 13 state maternal mortality review committees (MMRCs) were analyzed for preventability, factors that contributed to pregnancy-related deaths and MMRC-identified prevention strategies to address contributing factors.

Results
For 2011–2015, the national PRMR was 17.2 per 100,000 live births. Non-Hispanic black (black) women and American Indian/Alaska Native women had the highest PRMRs (42.8 and 32.5, respectively), 3.3 and 2.5 times as high, respectively, as the PRMR for non-Hispanic white (white) women (13.0). Timing of death was known for 87.7% (2,990) of pregnancy-related deaths. Among these deaths, 31.3% occurred during pregnancy, 16.9% on the day of delivery, 18.6% 1–6 days postpartum, 21.4% 7–42 days postpartum and 11.7% 43–365 days postpartum. Leading causes of death included cardiovascular conditions, infection and hemorrhage, and varied by timing.

Approximately 60% of pregnancy-related deaths from state MMRCs were determined to be preventable and did not differ significantly by race/ethnicity or timing of death. MMRC data indicated that multiple factors contributed to pregnancy-related deaths. Contributing factors and prevention strategies can be categorized at the community, health facility, patient, provider and system levels and include improving access to, and coordination and delivery of, quality care.

Conclusions
Pregnancy-related deaths occurred during pregnancy, around the time of delivery and up to 1 year postpartum; leading causes varied by timing of death. Approximately three in five pregnancy-related deaths were preventable.

Implications for Public Health Practice
Strategies to address contributing factors to pregnancy-related deaths can be enacted at the community, health facility, patient, provider and system levels.

FEATURED PUBLICATIONS

Changing the conversation: Applying a health equity framework to maternal mortality reviews.

American Journal of Obstetrics and Gynecology, September 2019. Kr [2]

ABSTRACT

The risk of maternal death in the United States is higher than peer nations and is rising and varies dramatically by the race and place of residence of the woman. Critical efforts to reduce maternal mortality include patient risk stratification and system-level quality improvement efforts targeting specific aspects of clinical care. These efforts are important for addressing the causes of an individual's risk, but research to date suggests that individual risk factors alone do not adequately explain between-group disparities in pregnancy-related death by race, ethnicity or geography. The holistic review and multidisciplinary makeup of maternal mortality review committees make them well positioned to fill knowledge gaps about the drivers of racial and geographic inequity in maternal death. However, committees may lack the conceptual framework, contextual data and evidence base needed to identify community-based contributing factors to death and, when appropriate, to make recommendations for future action. By incorporating a multileveled, theory-grounded framework for causes of health inequity, along with indicators of the community vital signs, the social and community context in which women live, work and seek health care, maternal mortality review committees may identify novel underlying factors at the community level that can enhance understanding of racial and geographic inequity in maternal mortality. By considering evidence-informed community and regional resources and policies for addressing these factors, novel prevention recommendations, including recommendations that extend outside the realm of the formal health care system, may emerge.

EVIDENCE FOR IMPACT

U.S. Congress passes Preventing Maternal Deaths Act to support maternal mortality review committees[63]

In 2018, new legislation authorized more than USD $12m for the CDC to help states establish and sustain maternal mortality review committees — this is the first time federal funds have been allocated specifically for this purpose.

The funding is also being used to expand data collection on maternal deaths — through the Review to Action platform developed with MSD for Mothers' support — enabling the U.S. to identify national trends and track progress in reducing maternal mortality.

Section 03. Strengthening health systems to improve the quality of maternity care

The publications included in this section highlight research aimed at improving the quality of care at the health system level. Articles highlight findings from community-level programs and initiatives as well as insights into the costs associated with pregnancy and childbirth.

PEER-REVIEWED JOURNAL ARTICLES

01 Al-Janabi, A., Al-Wahdani, B., Ammar, W., Arsenault, C., Asiedu, E. K., Etiebet, M. A., ... & Hansen, P. M. (2018). Bellagio declaration on high-quality health systems: From a quality moment to a quality movement. *The Lancet Global Health, 6*(11), e1144-e1145.

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04 Boyd, L. M., Mehra, R., Thomas, J., Lewis, J., & Cunningham, S. (2019). Features and impact of trust-based relationships between community health workers and low-income pregnant women with chronic health conditions: A focus group study. [Pre-print]

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03 Arogundade K., Femi-Pius O., Lateef, J.O., Onyejose, K.N., & Jega F. Institutionalizing Maternal and Perinatal Death Surveillance Response (MPDSR) in Cross River state, Nigeria: Progress so far and lessons learnt. *Presented at FIGO 2018 World Congress of Gynecology and Obstetrics.*
04 Femi-Pius, O. Partnerships and systems strengthening to reduce early newborn deaths — the Saving Mothers, Giving Life experience. *Presented at West African Health Organization 2018 3rd ECOWAS Forum on Best Practices in Health.*
05 Femi-Pius, O. & Arogundade, K. Working with transport workers to improving women's health in low and middle-income countries. An effective and sustainable intersectoral collaboration for health. *Presented at 2018 Canadian Conference on Global Health (CCGH) organized by Canadian Society for International Health.*
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Conclusion

We are inspired by the findings and insights generated by MSD for Mothers' collaborators and encouraged that their work is already leading to important and sustained changes about how to reach all women with high quality maternity care. We are optimistic that this growing evidence base will have a long-term impact on the health of women around the world.

At the same time, we recognize that many unanswered questions remain. In compiling these publications, we identified critical knowledge gaps that need to be filled. What barriers do birthing people and providers confront in seeking and delivering quality care? What do we know about the quality of care in private settings? What will it take to make maternal health outcomes more equitable? What levers — including incentives — are effective in building stronger health systems that address both the clinical and social contributors to health?

We also observed a need for greater diversity in the type of research conducted: hearing from women directly, analyzing electronic data in real-time, conducting meta-analyses, examining policies. More innovative approaches to capture and communicate data — both quantitative and qualitative — will enrich our understanding and our ability to act on what we learn. Ideally, they will also help us replicate successes more quickly and efficiently. The Maternal Health Atlas that our collaborators at the Institute for Health Metrics and Evaluation developed is one example. This tool aggregates up-to-date information on maternal mortality in a visual way, making it easier to spot trends and identify priorities for investing in research, programs, and policy change.

Finally, although our research compendium series is called *Evidence for Impact,* we know that generating evidence is only one step toward achieving the impact we want to see. We hope that these research findings will continue to support the advocacy, funding and action required — globally, nationally and locally — to improve the health of women around the world.

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Right to Care

Saving Mothers, Giving Life

The New York City Department of Health and Mental Hygiene

United Nations

University of Copenhagen

University of Maryland School

University of Michigan

University of Utah

Women Deliver

World Health Organization

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Endnotes

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